JULY 1, 1947

Engineering Library

AUTOMOTIVE INDUSTRIES

The Industrial News Authority Devoted to Automotive Products for Land, Air & Water

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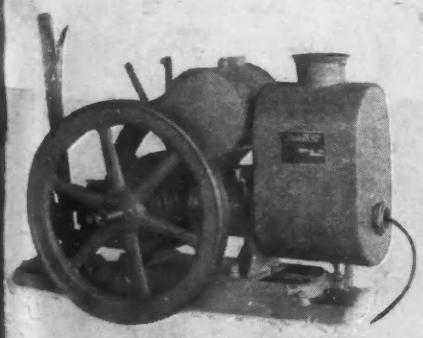
New Departure ball bearings served in the Fairmont Engine in this railcar since 1924.

"Supporting the crankshaft of a railcar engine is dirty work. We admit we've never had a bath; that's why the sludge and carbon."

"New Departure ball bearings are precision products—yes, but we also have to be mighty tough to take 23 years of this kind of work.".

"We're a bit loose due to fighting abrasive matter, yet we're whole and with lots of 'go' left. And modern New Departures are even better bearings."



Fairmont QHB Engine
New Departures on Crankshaft

nothing rolls like a ball

NEW DEPARTURE
BALL BEARINGS

NEW DEPARTURE-Division of GENERAL MOTORS-Bristol, Conn.-Branches in DETROIT, CHICAGO, LOS ANGELES and other Principal Cities

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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly July 1, 1947 Vol. 97, No. 1

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AUTOMOTIVE INDUSTRIES

Published on the first and 15th of the month

July 1, 1947
Volume 97, No. 1

Some High Spots of this Issue

GMC Announces Its Line of Diesel-Powered Trucks

A full line of eight basic heavy duty models designed specifically for Diesel operation has just been brought out by GMC Truck and Coach Division. The principal features of these new vehicles are described and illustrated in an article beginning on page 24.

The Tractor Industry's Expansion Program

Tractor manufacturers are planning to spend more than $100 million in a program that will increase the industry's capacity 50 per cent above prewar volume of production. Howard E. Everett gives the facts and figures, beginning on page 28.

Performance Data on the 12.5 to 1 Compression Ratio Gasoline Engine

A series of graphs showing comparisons between a new General Motors high-compression engine and a standard passenger car engine appears on pages 32 and 33.

Special Processes for Axle Production

High volume output of passenger car axles at the Salisbury Axle Works is made possible by such methods and equipment as automatic induction hardening of shafts, a gear annealing cycle that eliminates shot blasting operations, built-in monorail conveyors in washing machines, and others. Outstanding innovations at this plant are described by Joseph Geschelin in an article starting on page 34.

European Photoelectric Developments

Uncovered in Europe by an American technical intelligence mission, important design details of three photoelectric instruments useful for high speed engine research—the Maihak pressure indicator, Hoppe torsiograph, and Kendall injection needle valve lift indicator—are explained by Dr. Kalman J. DeJuhasz. See page 36.

24 New Equipment and New Product Items And Other High Spots Such As:

How brittle coating tests can be used to improve chasses and engines, Buick's application of advanced production methods at its engine plant, flashbacks on the SAE French Lick meeting, the unusual power plant arrangement on the British 143-ton transoceanic airliner, and an unique application of high frequency dielectric heating in producing resin-impregnated filter papers.

Comprehensive Interpretation of Industry News, Page 17

For Complete Table of Contents, See Page 3

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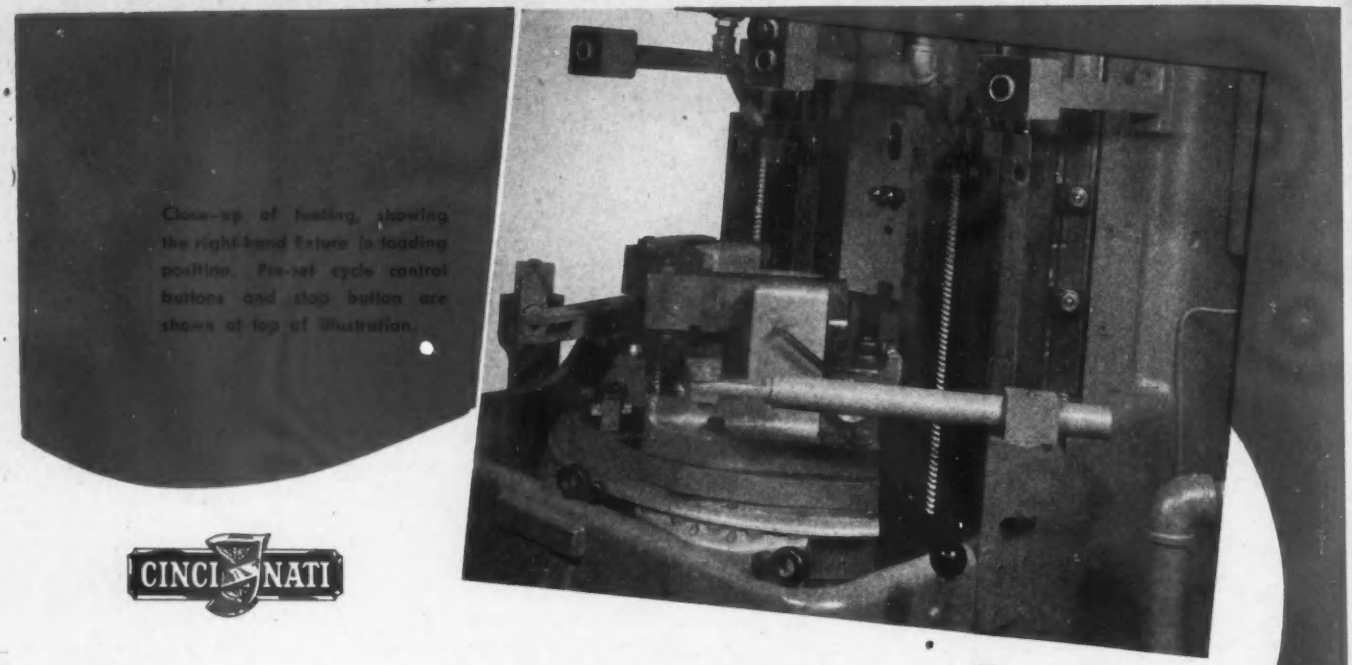


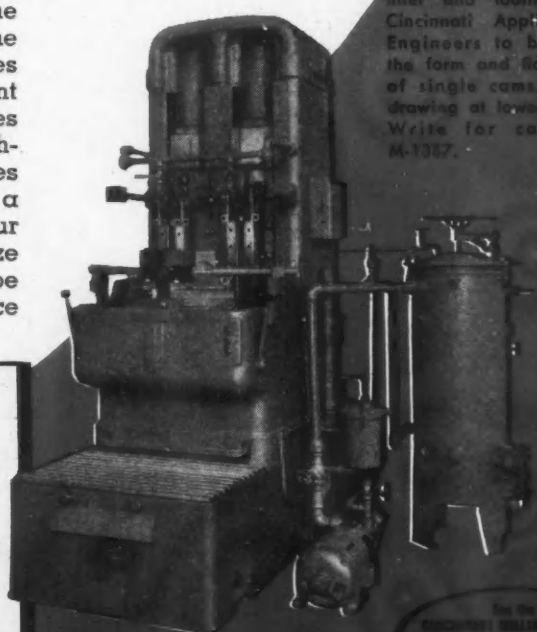
Close-up of tooling, showing the right-hand fixture in loading position. Pre-set cycle control buttons and stop button are shown at top of illustration.

CINCINNATI

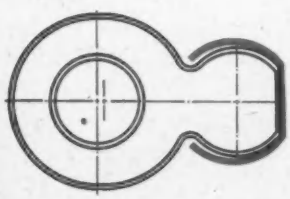
Broaching the formed end of cams

AT THE RATE OF 670 PER HOUR

The operator of the equipment illustrated here broaches 670 cams per hour . . . with conveyers, production could be even higher! This amazing output, on a CINCINNATI No. 3-30 Duplex Hydro-Broach with tooling by Cincinnati Application Engineers, is accomplished because the fixtures are very simple to load and unload; clamping and unclamping is automatic; angular locating fingers retract with the motion of the rams. It's safe, too, for the Pre-set Cycle Control equipment prevents the rams from descending until the operator presses the buttons with two hands. ¶ Notice the coolant filter unit at the side of the machine. It improves finish and greatly extends the life of the broaching inserts. ¶ Any part manufactured in quantities of a hundred or millions can be produced at a lower cost if they can be surface broached. Our Application Engineers will be glad to analyze your requirements, and show you how it can be done. Get in touch with our nearest direct office or sales representative.



CINCINNATI No. 3-30 Duplex Vertical Hydro-Broach with coolant filter and tooling by Cincinnati Application Engineers to broach the form and flat end of single cams. (See drawing at lower left.) Write for catalog M-1387.



Drawing of the part broached on the equipment illustrated here.
Part name—single cam
Material—steel forging
Operation—broach form and flat on end
Machine—CINCINNATI No. 3-30 Duplex Vertical Hydro-Broach
Production—670 per hour

See the CINCINNATI MILLING DISPLAY at the MACHINE TOOL SHOW, Chicago, Sept. 17-25

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Vol. 97, No. 1 July 1, 1947

AUTOMOTIVE INDUSTRIES

NEWS of the INDUSTRY

Two Grand Juries to Probe Michigan Used Car Deals

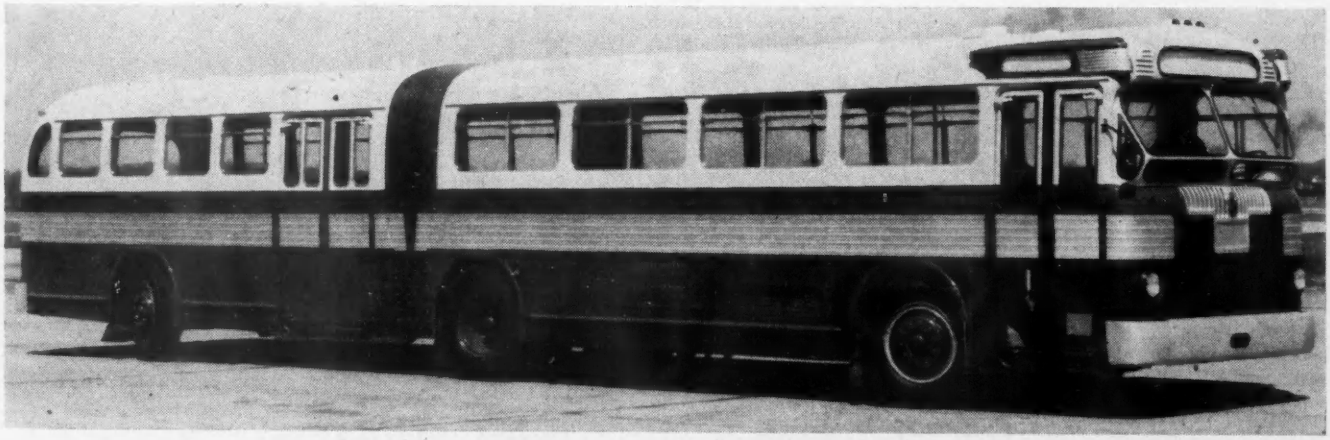
The long simmering so-called black market in automobiles in the Detroit area finally blew up in mid-June with the calling of two grand jury investigations at Detroit and Flint and indictments against several used car dealers. The state attorney general's office has started action against the dealers charging them with violating the State Licensing Law by selling new cars without obtaining a new car dealer's license. The used car dealers contend that they are within the commonly accepted definition of used cars when they sell automobiles which have been transferred to an individual from a dealer. The State contends that cars sold under such conditions are not bona fide used cars and consequently the dealers are violating the law in selling them. It appears that a court test of the specific wording of the law will be required to settle that particular phase of the dispute. However, the grand jury will go into other aspects of the new-used car business by searching for title jumping concerns who use stand-in or fictitious names on titles to show an original purchase before offering new cars to the public as used cars at exorbitant prices. The scope of the inquiry also will reach into new car dealerships to determine whether any dealers are engaged in furnishing cars to used car lots either directly or through a go-between source. Sales by automobile factory employes who obtain cars from factory quotas also will be probed. The general opinion in Detroit is that there will be a great deal of fuss and furor but that it will be very difficult to get any conviction since there is a great deal of question about the illegality of selling a nearly new car as a used car at prices above that quoted for new vehicles.

Automotive Excise Tax Rate May Be Cut by End of Year

Despite current reports that no revision of automotive excise taxes is possible this session of Congress, a Washington source reports that the tax rates may be adjusted before the end of this year. He states that Congress may recess this summer and that before it does so, the House Ways and Means Committee may report favorably on an excise tax reduction for automotive products. Then, when Congress reconvened in the autumn, the bill possibly could be passed by the Senate.

A. E. Barit, president of Hudson Motor Car Co., presented the industry's appeal before the committee early in June. He asked for repeal of automotive excise taxes on the basis that they are a discriminatory burden on lower income groups and that they place a relatively greater burden on farmers and other non-urban motorists who depend primarily on automotive transportation. It is the opinion of informed sources, however, that the best that can be hoped for is not an outright repeal but rather a cutback to the prewar level. Actually, the industry looks at the problem of total repeal as a long range program which may take ten years or more. Excise taxes were doubled early in the war as a temporary measure. However, it is recalled that it was not until 1929 that special automotive tax levels during the first World War were completely removed. It is reported that there has been no concerted opposition to cutting the automotive excise tax rate and that Mr. Barit's presentation was favorably received by the Congressional Committee.

New Articulated SuperTwin Coach



The front and rear wheels of this exceptionally maneuverable new articulated SuperTwin Coach inter-steer so that this bus, 47 ft. in length, can be parked easily in a space of 55 ft. Designed to carry 58 passengers, the new bus is constructed entirely of aluminum and weighs 22,800 lb. Powered by two 180 hp gasoline engines, B. F. Goodrich rubber Torsilastic springs at the wheels and special-type Torsilastics hinge and provide horizontal springing for the front end of the articulated section.

NEWS of the INDUSTRY

Tucker Unveils the Torpedo

Previewed for the first time recently, the Tucker Torpedo was shown to dealers and distributors in Chicago. The flywheel, ring gear, clutch, universal joint and drive shaft used in conventional models are eliminated in the Torpedo, according to Mr. Tucker, who says that production capacity of 170 cars a day is expected by the end of the year. The company is going ahead with plans for production in September despite its current controversy with the SEC over stock registration. Acme photo.

World Record, 623.8 mph, Set by Lockheed P-80R

Thundering over Muroc, Calif., at an average speed of 623.8 mph, a Lockheed P-80R Shooting Star, jet propelled Army Air Forces fighter, set a new world's record. Powered by a new Allison 400 turbo-jet engine, the plane shattered the previous world record of 616 mph which was set in Sept. 7, 1946, by a British Gloster Meteor IV powered by two Rolls-Royce Derwent turbo-jets.

The highest powered jet engine to be manufactured in this country, the Allison Model 400, is expected to be put into production this fall by the Allison Div., General Motors Corp. Of generally the same type as the Allison J-33-21, the new engine is rated at about 7500 hp at 600 mph. The new engine, installed in the Lockheed P-80R Shooting Star, is also scheduled for a new production series of that plane as well as for Navy aircraft.

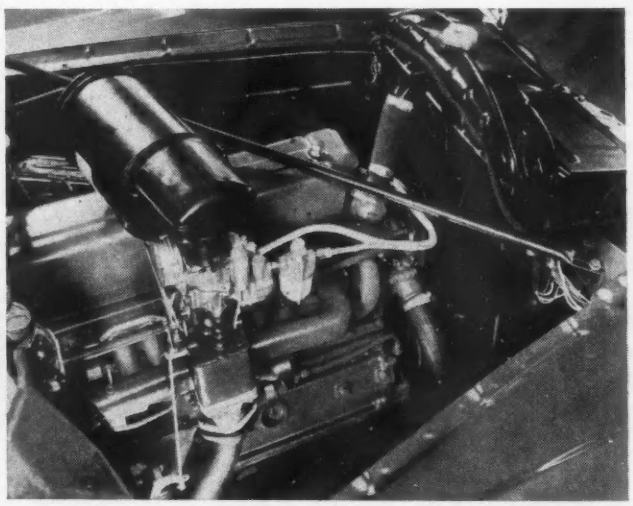
GM Transmission Div. Plans To Expand Output Facilities

Automatic transmission talk boomed again in Detroit recently when it became known that the General Motors Corp.'s Transmission Div. has plans for expansion of its production facilities. It is not known where the required new plant space will be located, but Detroit, Cleveland, and other cities have been mentioned. A considerable investment in new machinery and equipment will be required. Although GM has made no official confirmation, it appears that the expansion program reflects the wide public acceptance of the Hydra-Matic transmission on Oldsmobile and Cadillac. About 90 per cent of these two models now go out equipped with the Hydra-Matic drive. There has been considerable speculation that the move indicates adoption of the unit by Buick and Pontiac but this does not seem likely at least so far as Buick is concerned. Latest reports indicate that Buick, while interested in an automatic transmission, undoubtedly will have something other than Hydra-Matic and that, when it does adopt an automatic transmission, it will be built by Buick.

Body Engineers Meet In Detroit in November

The American Society of Body Engineers, Inc., will hold their annual convention in Detroit, November 5-7. Among the trends to be covered by speakers in eight sessions are styling, production engineering, small cars, seating comfort, truck bodies, buses and coaches, materials in body construction, and passenger car body engineering.

GM's Engine of the Future



Here is a close-up view of the General Motors Research Laboratories high compression gasoline engine that Charles F. Kettering took the wraps off last month at the SAE summer meeting. Its appearance and equipment are conventional, but what makes it different is that it has a 12.5 compression ratio and is designed to withstand the higher pressures and loads. It has a Chevrolet carburetor and manifold and Buick cams were selected to give it high output in the upper speed range. Kettering estimates that its cost will be about five to 10 per cent above that of a current passenger car engine of similar size. Performance of the engine, shown here in an Oldsmobile car, is given on page 32.

NEWS of the INDUSTRY

Production Innovations at New Chevrolet Flint Plant

For the first time since early 1942, Chevrolet cars and trucks are being built at Flint. General Motors Corp.'s Chevrolet Div. is now operating in its large new assembly plant there, which covers almost 29 acres. Representing a quarter of a century of automobile assembly plant experience, the new unit consists of a total of ten buildings located on a 104 acre site just west of the Flint city limits. A complete Fisher Body unit is built as an integral part of the plant. Total floor area of both units is 1,250,000 sq ft. The plant began operations in late May and, when employes are completely trained and everything is running smoothly, will turn out 60 cars and 20 trucks an hour on the two passenger car lines and the single truck line. Chevrolet is said to be the first high volume producer to use the suspended assembly type of production line in which the chassis is suspended from an overhead monorail type conveyor. According to plant engineers, this brings the work to the employe at bench level, permits right side up for assembly of the chassis and gives free access from all sides. Of the nearly 4½ miles of conveyors of all types used in the plant, only approximately one-half mile is of the floor type, indicating the extent to which the overhead assembly conveyor idea is used.

The assembly building proper measures 1001 by 663 ft with a central main assembly bay 60 ft wide by 60 ft high. It is surrounded by a two floor balcony devoted largely to passenger car paint and trim operations and a truck cab building shop and paint shop. A unique feature of the assembly operation is a final assembly line switch, with two lines progressing from dual line positions. The two lines are supplied by a single chassis line and are paced at one half speed to accommodate the more exacting and time consuming operations required after the body is mounted on the chassis. Another unique feature is that the frame is assembled completely in the assembly plant, requiring considerable welding and riveting equipment. At the end of each final assembly line, cars are driven onto a pneumatically operated parallelogram which automatically checks and trues wheel alignment and simultaneously adjusts headlights by means of photoelectric cells. Other features of the new plant are the paint mixing room; the battery of 14 mixing and circulating systems to pump paint throughout the plant; sealed spray booths supplied with fresh air under pressure and controlled as to temperature and humidity; a "power-and-free" conveyor system in several places which allows the chassis to be moved either by the power chain or by hand so that assembly workers can pace the rate of flow; an elevator device for lowering the frame carrier to the proper level at the beginning of the line; an employe cafeteria accommodating 800; complete medical facilities including such special equipment as a diathermy machine and special baths for physical therapy; and paved parking lot for employes with a special entrance which requires no crossing of streets or highways.

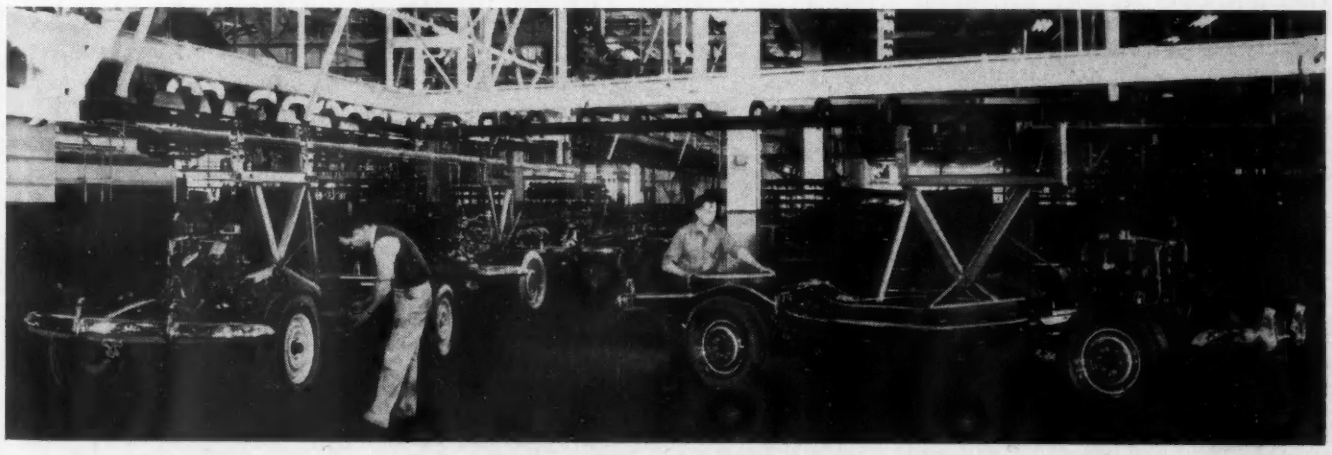
GE to Test 4800 hp Gas Turbine in July

A 4800 hp gas turbine for locomotive or other portable or stationary use will be tested in July by the General Electric Co. in Schenectady, N. Y. Air intake is less than one-third as much a horsepower as that used by a locomotive diesel for cooling and combustion, although air is pumped at a rate of about 70,000 cfm by the axial-flow compressor. Somewhat similar in general arrangement to the GE TG-180, the locomotive gas turbine is a straight through, in-line arrangement of compressor, combustion chambers, and turbine.

Ethyl Plans Expansion To Cost $20 Million

Expansion of Ethyl Corp.'s manufacturing facilities will be accomplished in a $20 million program of construction. Manufacturing capacity will be added to the Baton Rouge, La., plant, which is now reported to

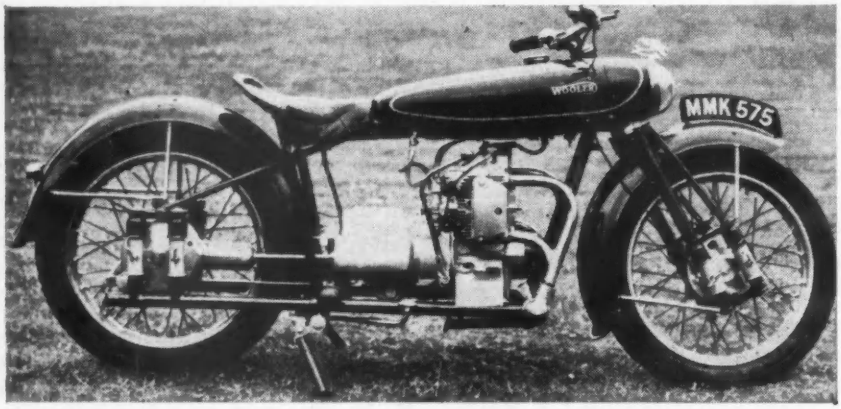
Chevrolet Assembly at Flint



At the switch in Chevrolet's new Flint, Mich., assembly plant, where completed automobile chassis emerge from a single assembly line onto dual lines, preparatory to the body drop. From this point, each line proceeds at one-half the pace of the chassis line on the unique suspended assembly conveyor system, introduced by Chevrolet in high-volume output operations. This new Chevrolet assembly plant has a capacity of 80 vehicles an hour—60 passenger cars and 20 trucks. Located on a 104 acre site on Van Slyke Road, just beyond the western boundary of Flint, it comprises 1.250 million sq ft of floor space in 10 separate units under one roof. Included is a complete Fisher Body manufacturing unit

NEWS of the INDUSTRY

Slim, Trim and Racy



Created by John Wooler, Britain's motorcycle pioneer, this postwar motorcycle has a four cylinder, five hp engine of 500 cu cm, with a totally enclosed shaft drive and can be dismantled in thirteen min. Acme photo

be the largest of its type in the world. Tetraethyl lead facilities will be increased by new construction. The construction of terminal storage plants on the East and West Coast and in the mid-continent area, and the installation of a drumming plant at Baton Rouge will improve storing and delivery of Ethyl antiknock compound.

New Wright Laboratory Tests Largest Turbine Engines

The largest aircraft gas turbine engine laboratory ever operated by private industry for the Government is now in operation for the Army Air Forces by the Wright Aeronautical Corp., engine building division of Curtiss-Wright Corp., in Wood-Ridge, N. J. Now testing the largest turbine-type aircraft engines under development in the world, the laboratory is equipped with General Electric dynamometers designed to measure up to 20,000 hp. The size of the new Wright engines being tested was not revealed, but it is expected that they will approach the output of the four Cyclone-type engines in the Boeing Superfortress.

IHC Producing Farmall Cub, Small, All-Purpose Tractor

The Farmall Cub, a small, low-cost tractor, and a full line of matched implements is now being produced in volume by the International Harvester Co. at the Louisville, Ky., factory, formerly the Curtiss-Wright plant. The small farm, truck garden and orchard operator are among the many direct users of the Farmall Cub which will sell for $545 f.o.b. factory. Weighing 1200 lb, the Cub is powered by a four cylinder engine with a bore and stroke of 2⅝ by 2¾ in. and with a piston displacement of 59.5 cu in. Developing about 9¼ maximum belt hp and approximately 8 maximum drawbar hp, the Cub's wheelbase is 69⅜ in. and it is 98½ in. in length and 47¼ in. in width, minimum tread, and 68⅜ in. in width, maximum tread, and it is 62½ in. high, to the top of the steering wheel.

When full production is attained some time next year, output is expected to reach the rate of 50,000 a year.

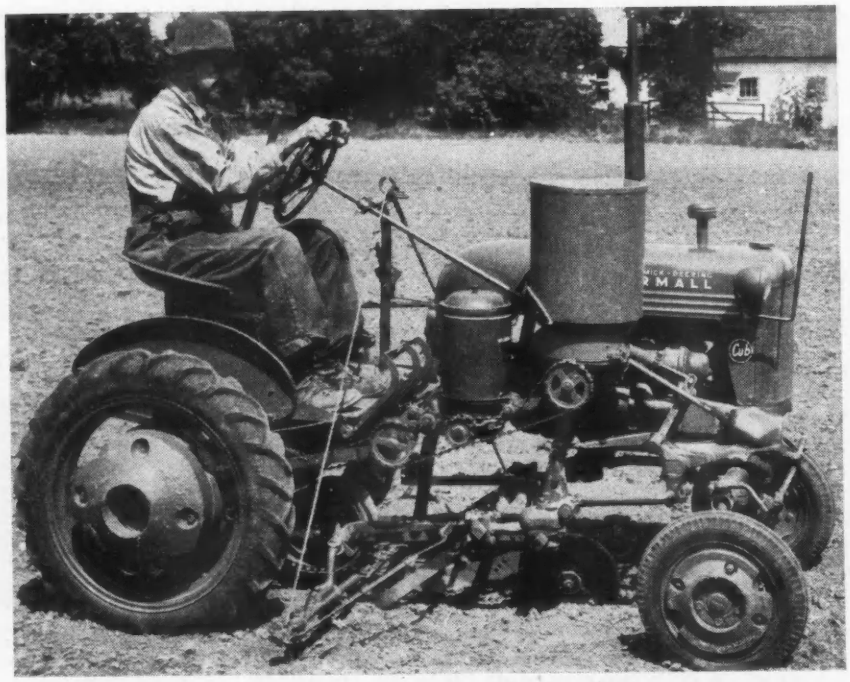
Ward Estimates Production Rise for Week Ending June 20

The output of cars and trucks in the U. S. and Canada for the week ending June 20 was estimated at 103,278 by Ward's Automotive Reports. This compares with a revised estimate of 97,943 units for the previous week and 54,475 for the comparable week in 1946. In the similar week in 1941, 133,565 units were built.

Ford Plant in Germany Making 12 Trucks a Day

The Ford plant in Niehl, on the outskirts of Cologne, Germany, is now turning out 12 three-ton trucks each day, and is reconditioning from 1200 to 1500 vehicles each month for the area's British and Belgian occu-

International Harvester's Cub



Especially designed for small farms, International Harvester Co.'s new Farmall cub tractor is shown drilling corn with planting equipment and fertilizer attachment. For planting cotton and other row crops in the South, a similar planter attachment is available

pation forces. Now employing 2700 persons, prior to the war the plant employed from 6000 to 7000 and produced 40,000 vehicles a year. The plant is now held technically by the British Military Government.

Automobile Facts & Figures Preview Now Available

A preview edition of Automobile Facts and Figures for 1946 is now available. Published by the Automobile Manufacturers Association, the 27th edition of the complete compilation will be issued shortly.

According to the preview edition, 1946 employment in the automobile industry reached a peak of 661,000 hourly rated employes and 178,000 salaried workers. The AMA also reported that there were 4,956,000 truck and bus drivers; 191,000 federal and state employes working on constructing highways; 1,311,000 persons in sales and service jobs; and 1,741,000 engaged in manufacturing and miscellaneous operations directly related to the automotive industry.

Continental Motors Making Small Air-Cooled Engine

In its first departure from the liquid-cooled engine field, except for aircraft engines, Continental Motors Corp. has gone into production on a new 1½ hp single cylinder air-cooled engine. It will be used for small tractors, power lawn mowers, conveyers, pumps, scooters, and small construction equipment. Wisconsin Motor Corp., a Continental subsidiary, is prominent in the field of heavy duty air-cooled engines for industrial and agricultural uses.

Machine Tool Makers Urge Shorter Amortization Time

As a result of the veto of the tax reduction bill, manufacturers of machine tools and process equipment are intensifying their efforts to obtain Treasury Dept. revision of policies on depreciation of capital assets. The National Tool and Die Manufacturers Association has been active for several years in a drive to change the provisions of Sec. 102 dealing with tool life expectancy and depreciation. Tell Berna, general manager of the National Machine Tool Builders Association, stated that the importance of tool obsolescence in revision of tax policies should be recognized because tools may become obsolete through new inventions. He said that the available life of a machine tool is only seven years and that good practice requires recovery of the investment out of earnings during the first seven to ten years of tool life, but that the Treasury Dept. does not approve that practice. C. E. Wilson, president of General Motors Corp., commented recently that much higher machinery cost is creating a problem for industry. He points out that a machine bought 12 years ago for $10,000 and depreciated over that period on the basis of original cost has a replacement cost of about $20,000 which means digging up an additional $10,000 for the new equipment.

Oldsmobile Uses New Machine To Test Torsional Stresses

Oldsmobile Div., General Motors Corp., has installed a new torsion testing machine for determining all degrees of twist and increment of stress loading of torsional parts used in its passenger cars. The machine is being used currently by the engineering dept. for testing Oldsmobile axle shafts forged at the plant. Torque capacity of the machine ranges up to 120 lb-in. Speed of the testing force ranges from 2 to 180 deg/min and is controlled through an electronic control and an electronic variable speed motor. Speeds of infinite selection up to 180 deg/min can be maintained accurately within 1 deg plus or minus. Maximum length of solid bar specimens accommodated by the machine is limited to 5 ft 4 in. and 3 in. in diameter or its equivalent.

Pontiac Wars on Waste With New Salvage Program

The new salvage program developed by Pontiac Div., General Motors Corp., indicates how automobile companies are wringing the last penny from scrap materials and accumulations of waste that are part of the manufacturing process. It has built a modern new salvage building fully equipped with the latest equipment to sort and process waste metals, paper, and assorted refuse. The company surveyed the industry and has come up with a comprehensive program embodying all that is known about the science of salvage.

A key point in the program is that sorting is the secret of success in salvage business. Miscellaneous scrap brings little on the market, but segregation makes possible the reuse of some materials and a higher market price for that which is sold. Under the new system, sorting starts at the point of collection. There are special galvanized containers and trucks for handling floor sweepings; large wire containers for scrap paper; specially designed, quick dumping trucks for hauling scrap to the salvage building, and hoppers with a low center of gravity to carry sludge and liquids to the dumps.

New Jeep Truck Makes the Grade

Weighted down with a one ton load, the new four wheel drive Jeep truck is shown climbing a 51 per cent grade at the Willys-Overland Motors, Inc., proving grounds in Toledo. The new truck can be equipped with a power take-off enabling the engine to be used for varied industrial and agricultural applications

Figures compiled by the salvage department show the scope of the operation. They include: A trailer load of salvaged material every 4½ minutes of the first and second shifts; an average of 75 trailer loads of combustible refuse burned in a special incinerator; more than 7½ tons of paper baled daily, with 700 corrugated cartons folded and returned to vendors; about 1000 ft of lumber reclaimed each day for parts shipping; 12 loads of wood daily for rekindling cupolas and seven to eight loads for sale to employes; an average of 37 steel drums and 100 boxes and kegs returned daily; an average of five rail car loads per day of iron and steel for remelt in the foundry, and from 20 to 25 barrels of cutting oil recovered every 24 hours. Oil soaked steel chips are put through a centrifugal wringer which throws off the oil, which is clarified for re-use.

Polaroid Glass for Cars Killed by N. Y. Lawmakers

A measure to require installation of polaroid glass in all windshields was killed by New York legislators on the grounds that it would have meant changing all headlights to polaroid glass, in addition, to effectively get rid of glare. The bill was rejected as impractical because such a program would have been much too costly to automotive vehicle owners. Installation would require, in addition to the polaroid glass, special electrical equipment, particularly a higher output generator.

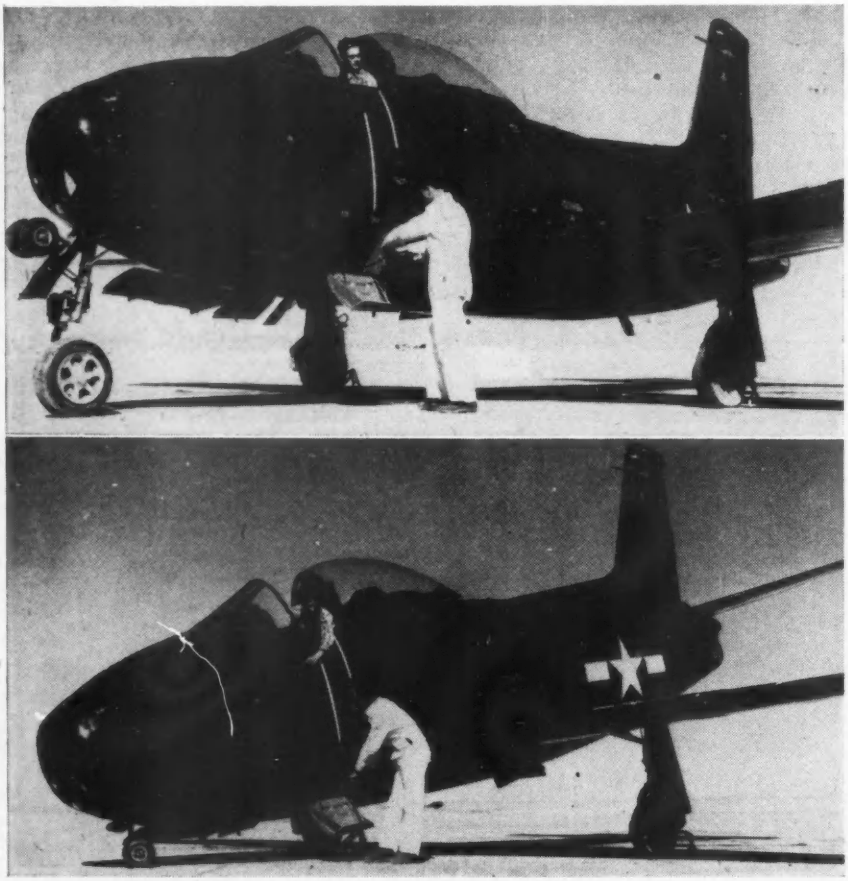
Diesel Engine Makers See $200 Million Business

Harvey T. Hill, executive director of the Diesel Engine Manufacturers Association, reports that Diesel engine manufacturers should do well over $200 million worth of business annually for the next ten years. He said that the best prewar year, 1939, volume was $45 million.

Ford Material Costs Up 47 Per Cent Over Prewar

E. R. Breech, executive vice president of Ford Motor Co., made some interesting comments recently on increased costs over 1941 as related to new car prices. Material costs, he said, are up 47 per cent over 1941 and steel alone costs one third more. Average hourly rates, including increases from added benefits from extra payments, are up 60 per cent not including the anticipated wage settlement at Ford. Construction costs for new facilities are nearly double the prewar level, he said. Another interesting news item is a recent report stating that Ford still is paying in the neighborhood of $26,000 a week for premium shipments of badly needed materials.

Navy Jet Kneels



A nosegear that bends enables the North American XF J-1, Navy jet fighter, to kneel on crowded carrier flight decks, aiding crews in taxiing or pulling the plane to any spot. Two telescopic "kneeling cylinders" attached to gear shock strut enable the nose landing gear to be lowered or raised independently of the main gear. International News photo

Germany Had 143 Factories Underground at War's End

In the present era of atomic thought, it is interesting to note that at the close of the war, Germany had a total of 143 underground factories in production including about 20 per cent of the airframe capacity, virtually all the V-weapon production and nearly 60 per cent of aircraft engine capacity. Chief difficulties encountered are reported to have been water seepage, flooding, noise absorption, falling dirt and rocks, gas proofing, and dust control. A major weakness of subterranean factories, it was found, was that supporting activities such as transportation, power and water supply, forges, and workers' homes were above ground. Bombing of these activities greatly reduced the effectiveness of going underground and disrupted operations.

Ford Makes Driving Aids For Disabled Civilians

Ford Motor Co. states that it is the first automobile company to make available at cost special driving controls for Ford cars to disabled persons other than war veterans. Cost of installation on a passenger car will be about $200. It is said to be the first time that disabled civilians will be able to buy the special driving aids other than on individual specifications.

NEWS of the INDUSTRY

Labor

Ford's Foremen Strike Doesn't Stop Production

Although the strike of 3800 foremen at the Ford Motor Co. Detroit plants has been a nuisance, it has not materially curtailed production. At the end of the third week of the strike, the company reported production of cars, trucks, and tractors was within 2½ per cent of schedule. During the period, the Mercury line at the Rouge was shut down for a week because of a labor dispute at Murray Corp. which supplies frames and body parts. The strike has not affected Ford's 13 branch assembly plants in the U. S., which in many cases were able to produce more than the scheduled number of cars and trucks. Actually more Ford passenger cars were produced than scheduled, but trucks were slightly under schedule as were Mercury and Lincoln passenger cars.

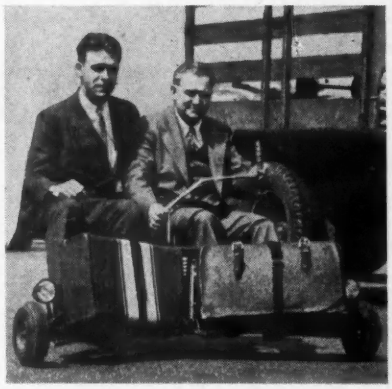
Many Parts Makers Settle For Less Than 15¢ Pattern

A tabulation by Automotive and Aviation Parts Manufacturers shows that, of 84 wage settlements reported in the parts industry, 39, or 46.5 per cent, have been for less than the so-called 15-cent pattern. A few companies made wage rate adjustments which included compensation for paid holidays (or in lieu of paid holidays). About 50 companies gave paid holidays as such; two companies gave two holidays; two companies gave three; one company four; 43 companies six; one company seven; and one company eight. Some settlements did not give pay in lieu of holiday or paid holidays. At least half of the settlements calling for paid holidays carried eligibility rules more restrictive than those of the GM-Chrysler agreements. A number of agreements do not provide holiday pay when a holiday falls on a non-working day (Saturday or Sunday) or when an employe is laid off for lack of work. Some contracts provide that an employe will not be paid for a holiday falling within a vacation period selected by the employe. Among the contract gains for companies were: penalties for failure to meet production standards; two year contracts; change from plant-wide to more workable departmental seniority; revisions in working of seniority rules; profit sharing plan instead of general wage increase; reduction in number of union representatives; restrictions on time union officials can spend away from job; reduction in the number of shop committee members; reduction of chief stewards from two to one a shift; elimination of maintenance membership; revokable check-off instead of involuntary check-off; establishment of wage incentive plan; and improved grievance procedure.

Packard Settles for 15¢ —Excludes Paid Holidays

Packard Motor Car Co. is the first automobile manufacturer to settle for the 15-cent pattern without including paid holidays. The agreement calls for a straight 15 cents an hour increase and runs for two years. The contract may be opened only once during that period. As part of the agreement, the union will dismiss portal-to-portal pay suits totaling $44 million as well as "super seniority" suits amounting to $1.765 million. All holiday work will be paid for at double time, continuing previous practice.

Portable Transportation



Private plane owners can now carry their transportation with them. The Airscoot, co-invented by riders Don Mitchell and Dick Jenner and made by Aircraft Products Co., Wichita, weighs 72 lb and can support 450 lb at a top speed of 25 mph. Built of aluminum and magnesium tubing, it is powered by a one cylinder, four-stroke, 2.6 hp engine, averaging 60 mpg, and can be folded and carried in one hand. Acme photo

Metals

Copper

Stabilization of the domestic and foreign price of copper at 21.50¢ recently, quieted the copper market somewhat. The imminence of the vacation period has continued an active brass mill demand, and this coupled with a considerable wire mill demand has heightened domestic demand. A 40 per cent drop would still leave current domestic deliveries equal to those in the best prewar year, according to some producers.

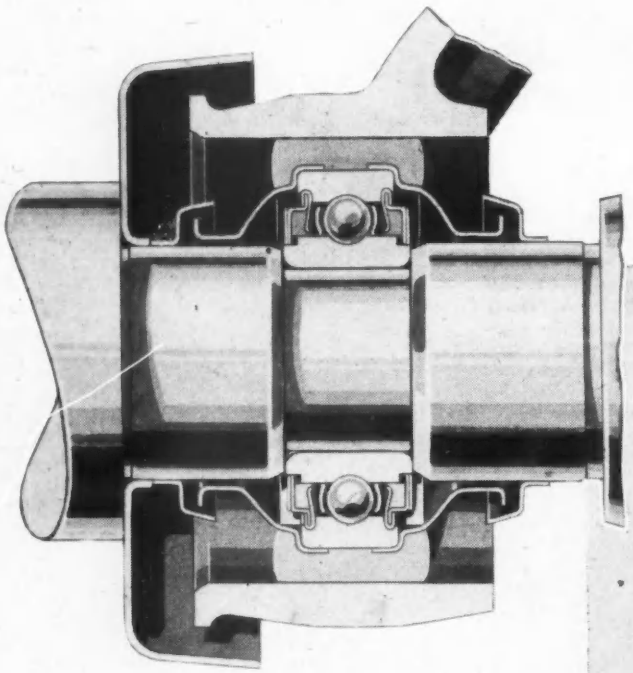
Lead

The mine and smelter vacation shutdown in July will cause curtailed production, but comparable shutdowns among consumers' plants will tend to balance the reduced supply. Demand after July will have to be met out of imports and current production as it is anticipated that the lead stockpile will be exhausted about then.

(*Turn to page* 70, *please*)

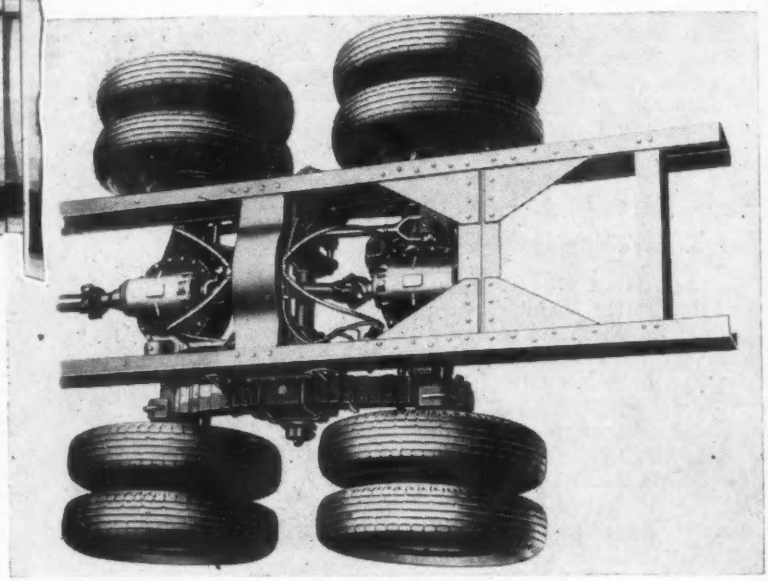
GMC Announces Line of

Eight Diesel-Powered



(Left) Cross sectional view of propeller shaft rubber-encased center bearing with permanently greased and double sealed ball bearing

(Below) Exterior view of the worm gear tandem drive rear axle. Parallelogram torque rod system is employed



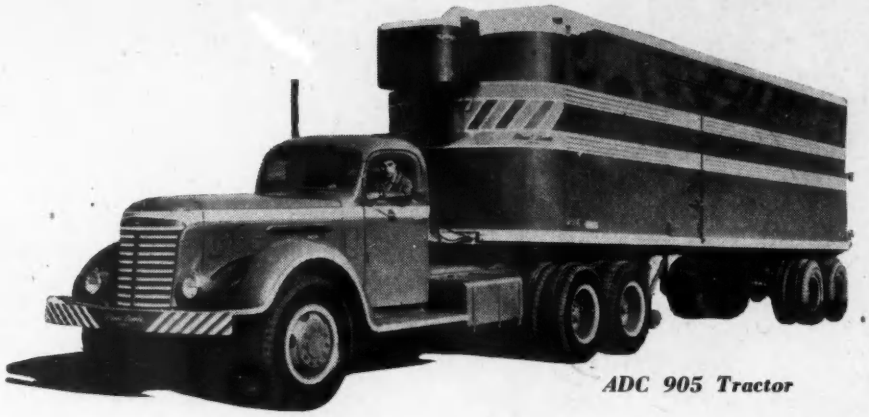
THE long awaited announcement of GMC Diesel-powered trucks placed on the market by the GMC Truck & Coach Div., reveals a full line of eight basic heavy duty models designed specifically for Diesel operation. The "750" models have the well known two-stroke GM 4-71 four-cylinder Diesel, while the other models feature the GM 6-71 six-cylinder Diesel.

These models include—with the conventional cab—ADCR750 for tractor service, ADC750 for truck service, ADFR750 for tractor service, ADF750 for truck service, ADC900 for truck service only, ADCR900 for tractor service only, ADCW950 and ADCW970 for truck or tractor service. The ADFR750 and ADF750 are C-O-E models.

Five major mechanical improvements incorporated in chassis of the GMC gasoline engine line also apply to Diesel models. These include—new front springs, improved steering, worm drive for six-wheelers, air power shift for two-speed axles, and a new line of double-reduction axles.

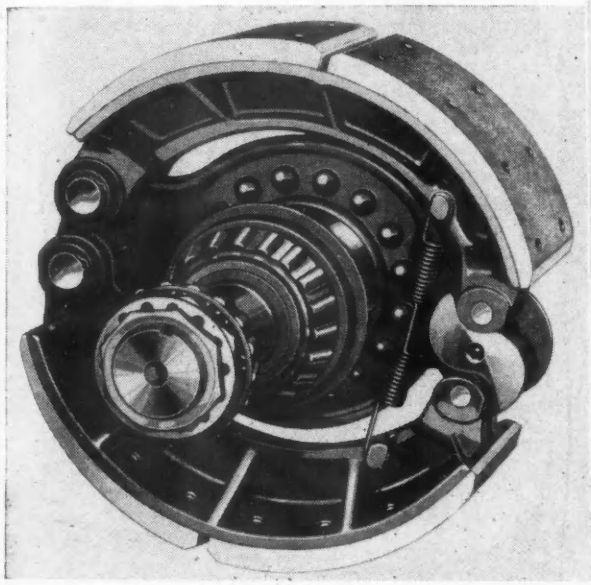
All-steel cabs of new design for C-O-E and conventional vehicles are said to combine passenger car comfort with safety credited to the adoption of "cradle-coil" seat cushions. These have hour-glass form soft action cushion springs, individually wrapped in burlap bags, with foam rubber pads over seat springs and thick jute and cotton padding in the seat backs. C-O-E cabs have deep bucket type seats with foam rubber pads in the cushions. The cabs have ample leg and head room, a wide visibility "V" windshield, quick-vision instrument panel, controls conveniently located, wide doors, all-weather insulation, and controlled ventilation. Windshield and door windows are of safety glass, the door glass being metal framed and

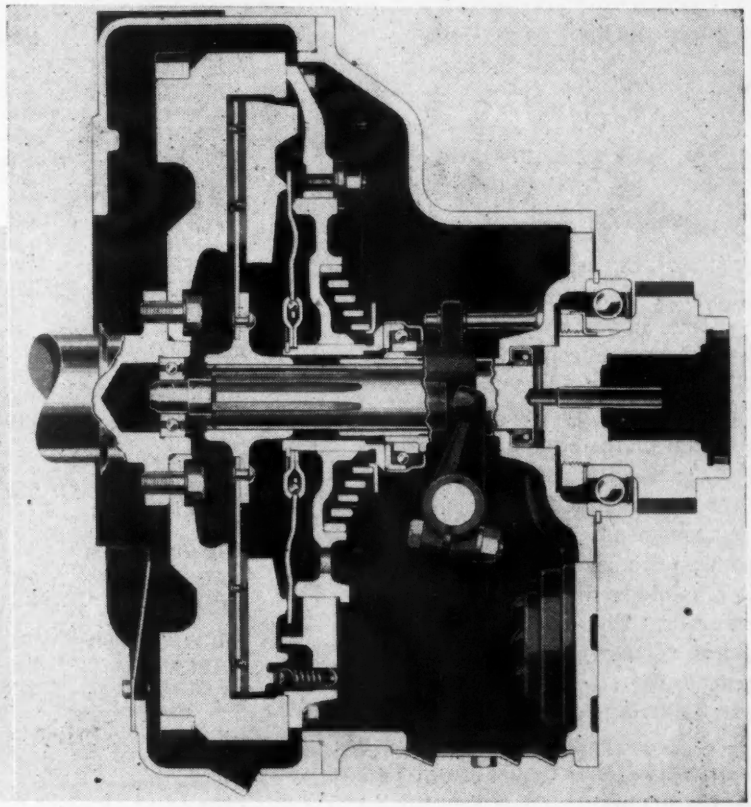
Models



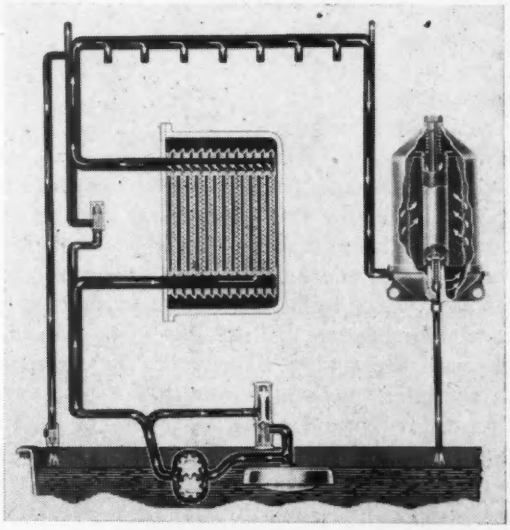
ADC 905 Tractor

(Below) GMC air brakes are of heavy, cast 2-shoe construction. The rear brake illustrated here features a single constant lift actuating cam for each pair of shoes





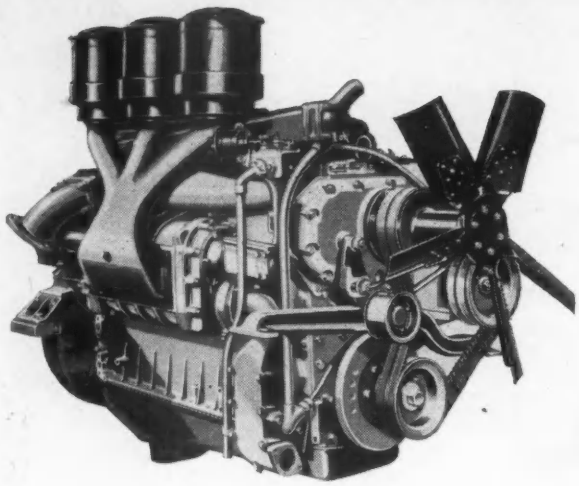
(Above) Cross section of heavy duty single disk clutch of non shock loading, force pressure type, with vibration damper



(Left) Diagrammatic view of oil filter and oil cooling system

rubber mounted around the outside edge to reduce the possibility of glass breakage.

On C-O-E cabs they have provided a heavily insulated engine cover and two cowl ventilators to supplement the adjustable windshield. All models from "900" and up have a longer and wider aluminum hood provided with a service door on the left side. This makes it possible to check and add oil without lifting the hood. The vertical exhaust stack—required by law on Diesel jobs in some states—is standard on all models, eliminates danger of cargo



Side view of GM 6-71 truck engine with accessories. It is equipped with three oil bath air cleaners

GMC Diesel Truck Specifications

(Condensed)

MODEL	WB	CA	CE	OL	CH	LH*	GVW (lb-max.)	Comb. Wgt. Rating (lb-max.)
ADCR750 & ADC750								
ADCR 752	136	60	107	221	55½	35	.....	50,000
ADCR 753	160	84	137	251	55½	35	.....	50,000
ADC 754	178	102	161	275	55½	35	30,000	.....
ADC 755	196	120	205	319	55½	35	30,000	.....
ADFR750 & ADF750								
ADFR 751	108	64	107	186	65½	35¾	.....	50,000
ADFR 752	136	92	139	218	65½	35	.....	50,000
ADF 753	160	116	169	248	65½	35	33,000	.....
ADF 754	178	134	193	272	65½	35	33,000	.....
ADF 755	196	152	237	316	65½	35	33,000	.....
ADC900 Group								
ADC9[illegible]	174	84	137	267	55½	36	35,000	.....
ADC9[illegible]	192	102	161	291	55½	36	35,000	.....
ADC[illegible]	210	120	205	335	55½	36	35,000	.....
ADCR900 Group								
ADCR 902	150	60	107	237	55½	36¼	.....	65,000
ADCR903	174	84	137	267	55½	36¼	.....	65,000
ADCW950 Group								
ADCW953	198	108	170	299	55½	37	45,000	70,000
ADCW954	216	126	204	333	55½	37	45,000	70,000
ADCW970 Group								
ADCW973	200	110	170	299	55½	39	55,000	90,000
ADCW974	218	128	204	333	55½	39	55,000	90,000

* With 10.00-20 tires.

Chassis Dimensions (in.)

WB—Wheelbase.

CA—Cab to rear axle (to centerline between axles on two-axle type).

CE—Back of cab to end of frame.

OL—Overall length (front bumper to end of frame).

CH—Top of cab to top of frame side rail.

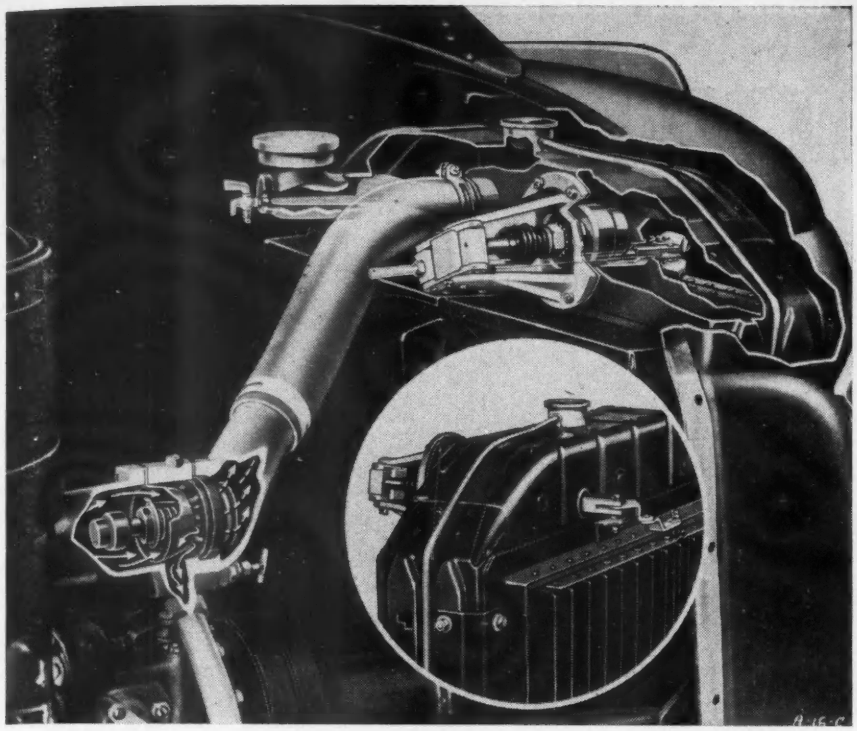
LH—Top of frame side rail (rear) to ground.

spoilage by leakage of exhaust gases.

Some important improvements have been made in the two-stroke GM Diesel engines used in this line. Larger oil coolers with additional plates have been provided to increase the cooling effect and decrease restriction to oil flow. Improvements in manufacturing processes are said to have made it feasible to dispense with the oil strainer. The cast iron oil pump gears formerly employed are replaced by steel gears. The oil pan has been changed to a deep sump design, assuring proper lubrication on grades upward of 25 per cent.

An outstanding feature is the new water circulation system. It is pressurized and employs an inbuilt overflow tank in the top tank of the radiator. Water, expanded or displaced by steam is forced into this secondary tank which is equipped with a relief valve to guard against excessive pressure. As the system cools, reducing the pressure, the water returns without loss. Larger water passages at the oil cooler, water pump, thermostat housing, water manifold outlet, and water by-pass provide more uniform pressure and temperature. More gallons of water circulate through the system to permit faster dissipation of heat. Cylinder head water nozzles direct a pressure spray of water around valve seats and injectors. This eliminates cracking of cylinder heads under normal operation. New type thermostats, not sensitive to pressure changes or vibration, assure more even water temperatures and greatly improve actuation of radiator shutters. The shutter thermostat has ample power to operate shutters regardless of air pressure or resistance offered by adhering dirt.

A rubberized felt insulation has been placed between the radiator core and shell around the top tank to prevent recirculation of hot air to the forward side of the radiator core. The core itself is center mounted to eliminate transfer of strain to the core—and bolts replace sheet metal screws in this assembly. Models 900 and up have larger radiator cores. Frontal area



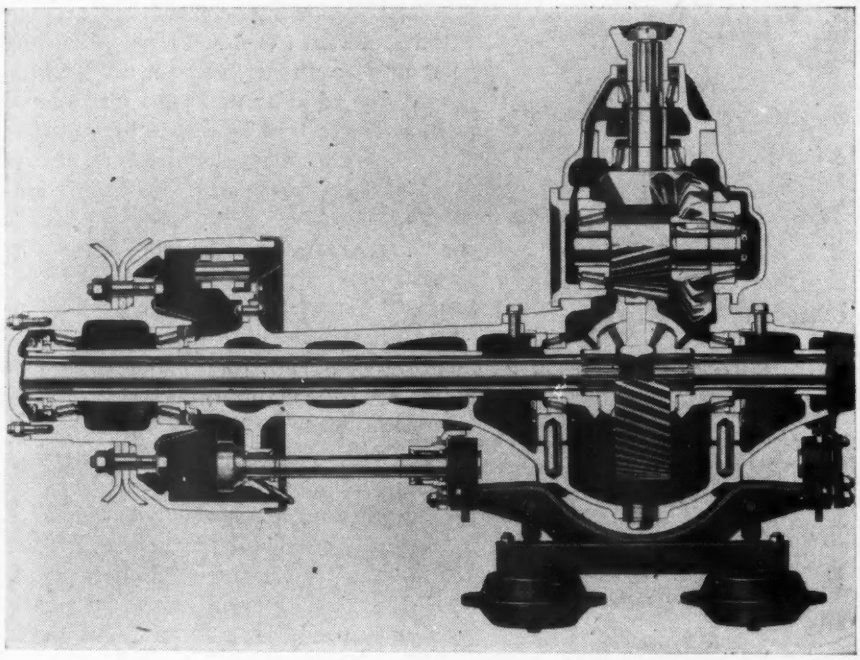
Phantom view of new cooling system arrangement

Blower operation is improved by the addition of a land on each lobe of the rotor to further reduce clearance and thus increase air delivery. Cylinder liners also have been redesigned to incorporate a single row of inlet ports 5/8 in. in diameter to prevent plugging. This also contributes to a more thorough scavenging of exhaust gases.

Because of improved scavenging and increased air supply it was found feasible to increase the delivery of the fuel injectors. Each injector now is calibrated to deliver 70 cu mm of fuel instead of 60. The net result of these major improvements has been to increase horsepower output of both engines by 21 per cent. On the 4-71 it represents an increase from 110 hp to 133 while on the 6-71 the boost is from 165 to 200 hp.

The GM 4-71 engine, used on all 750 models, has a 4¼ in. bore, 5 in. stroke, 283.6 cu in. displacement, 133 gross bhp (max.) at 2000 rpm governed speed, and 400 lb-ft gross torque (max.) at 1100 to 1400 rpm. The GM 6-71, used on all other models, has a 4¼ in. bore, 5 in. stroke, 425.4 cu in. displacement, 200 gross bhp (max.) at 2000 rpm governed speed, and 600 lb-ft gross torque (max.) at 1100 to 1400 rpm. These two-stroke engines are equipped with direct fuel injection, 12 volt electrical system, centrifugal governor, two-unit oil filter and two fuel filters.

A single disk type clutch with spring damper and fitted with toggle linkage to reduce disengaging effort is standard on all models. The 14 in. size is used on the "750" models, the 15 in. size on the others.



Cross section of double reduction rear axle with primary reduction through a hypoid bevel gear and pinion

has been increased from 629 to 753 sq in., an increase of 20 per cent.

The new fuel system now takes fuel from all tanks at the same time and eliminates 3-way and 4-way valves. The intake air heater for cold weather starting is now standard. Lubricating oil filters, generator, and governor are located higher on the engine to improve accessibility. An idler pulley for quick adjustment of fan and air compressor belts replaces the split-type pulley.

In addition to these improvements, GM has effected some major changes in other elements of the engine.

On front axles for models 900 and up the distance between king pin centers has been increased by 10 in.—from 57¾ to 67¾ in.—and the I-beam section heavied up to increase axle strength by some 32 per cent. To secure better road stability with the wider front axles, frame side rails formerly tapered in front are now parallel throughout their entire length. The

(*Turn to page 64, please*)

Big Expansion Ahead in Tractor

AMERICAN tractor manufacturers are planning expenditures exceeding $100 million in an expansion program which will increase the industry's production more than 50 per cent as compared with prewar capacity. The program includes new construction, acquisition of additional plants from governmental and other sources, extensive tooling and retooling and modernization of prewar facilities. Although the program was late in getting under way because of material and manpower shortages, some of the work has been completed to the point where limited production is possible. The entire program however will not be completed before 1948.

By

Howard E. Everett

Vice-President and Editor
Implement & Tractor

Necessitating this expansion are a number of well-defined trends, important among which is the impetus given farm mechanization by the war years and which has expedited the modernization of agricultural production by at least five years. More than a million farm workers who were in the various military services or employed in war industries are not returning to agricultural employment. Farmers cannot compete with present industrial wages. Work animals are no longer available. Hence there are no substitutes for tractors.

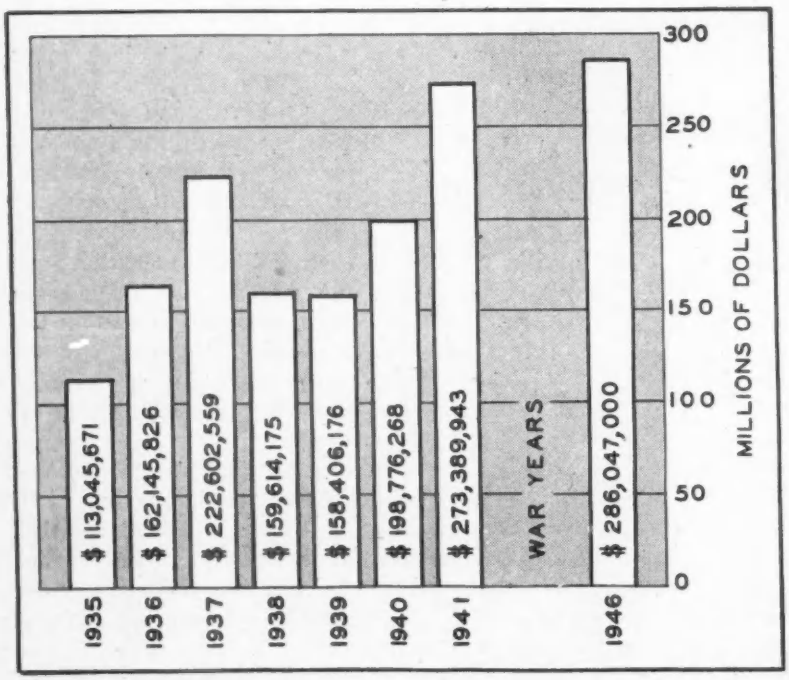
Another factor has been the greater outputs of farm commodities. This has been due to the application of tractor power to additional farm operations, forage harvesters for handling grass crops, one-man pickup hay balers, cotton pickers and strippers for the South, mechanical corn pickers, etc., all of which enable one man to do the work for which several were required in prewar years.

Most important for the immediate future has been the wartime development of smaller sizes of tractors, already announced by International Harvester and others of about 8 drawbar hp which will make mechanical farming economically possible on farms with as few as 40 crop acres. This is expected to open a new tractor market on at least a million of the nation's smaller farms, which previously could not use power without over-investing in equipment. Smaller power tools and implements have been developed for use with these smaller prime movers. Several other companies have similar tractors under development, one of which presents quite a departure from standard design, with its power plant in the rear, the seat in front of the engine and the working tools ahead of and in view of the operator.

The tractor industry was retarded throughout the 1930s by the farmers' poor financial position. Sales were just beginning to show rapid acceleration when war intervened. Today with several years of record income farmers have substantial cash reserves quite commonly

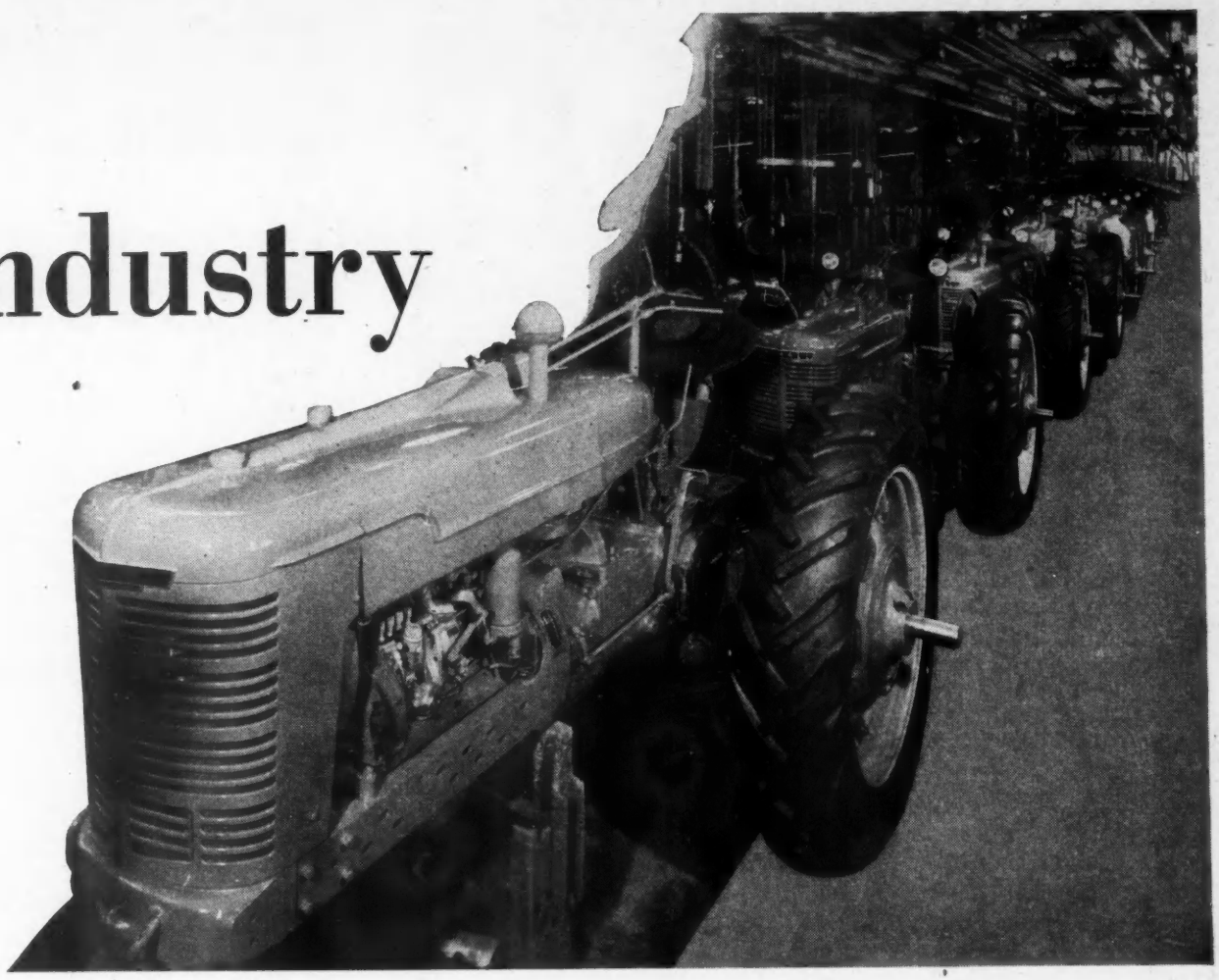
Peacetime Manufacturers' Tractor Sales in Dollar Volume

(For Farm and Non-Farm Use)



Source: Bureau of the Census

Industry



estimated at $14 billion, much of which has been ear-marked for the purchase of mechanical equipment.

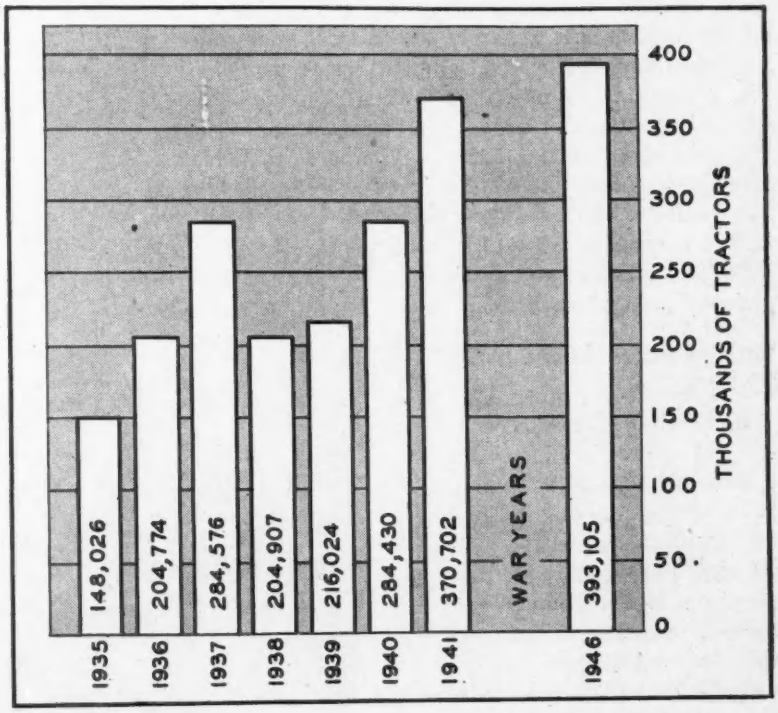
Another important factor is the overdue need for replacements of existing aged tractors. By measuring production against the number of tractors now on farms, it is apparent that the average retirement rate of prewar years has been reduced by at least 50 per cent during the last six years. Consequently an abnormal replacement potential exists for the immediate future.

Allis-Chalmers $25 Million Program

A postwar productive capacity exceeding that of prewar by 100 per cent or more is the objective for which the Tractor Division of Allis-Chalmers is currently spending $25 million. Approximately one million additional sq ft of manufacturing space will be provided and all its major plants will be affected

Peacetime Factory Shipments of Tractors

(Shown in Units for Farm and Non-Farm Use)



Source: Bureau of the Census

by the program of new construction, additions, modernization and new equipment. This expansion was started in 1946 with a $17 million program, part of which is nearing completion and $8 million additional work has been started or scheduled for the present year.

The most extensive programs are those for the West Allis agricultural tractor plant in Milwaukee and the industrial tracklaying tractor plant in Springfield, Ill. Improvements are to be made at the harvesting equipment plant at La Porte, Ind., the implement plant at La Crosse, Wis., and the heavy and deep tillage machinery plant in Oxnard, Calif. Recently Allis-Chalmers acquired additional space for the manufacture of farm machinery by leasing a former Ordnance plant at Gadsden, Ala., for three years with a purchase option.

Case Expansion

A program which J. I. Case has had under way for some time is now showing definite results. A recently completed addition to its Rock Island tractor plant, erected at a cost of $1.25 million is now in partial operation and eventually will provide for a production increase of as much as 50 per cent for its VA series of tractors, which are its smallest models. Greater expansion is under way at its main tractor plant, the South Works in Racine, where a complete new building erected four years ago for the production of military equipment is being retooled and rearranged for additional tractor assembly.

Further indicative of Case plans for the future has been the acquisition of two large plants operated during the war by the Quad City Tank Arsenal at Bettendorf, Iowa, at a cost of $3 million. Plant No. 1 includes 15 buildings with 774,600 sq ft of floor space on a 49-acre tract with Mississippi River frontage. Plant No. 2 contains 17 buildings with a combined area of 652,974 sq ft, which are on a site containing 65 acres. Production of pickup balers is being transferred to Plant No. 1 and later other production will find its way to Bettendorf. Among the facilities of Plant No. 2 is an extensive foundry, which will provide castings for tractors and supplement present facilities.

Caterpillar to Spend $30 Million

Caterpillar Tractor Co., the largest producer of tracklaying tractors, during 1946, expended $11 million for land, buildings, machinery and equipment, preparatory to launching a $30 million expansion program this year which will require until mid-1948 for completion. This program will add 41 acres to the floor area of the Peoria plant. The major part of the new program is a factory building, containing 925,000 sq ft, for the production of Diesel engines, which are now the principal power units in the company's tractors.

Another new plant, of 450,000 sq ft area will enable the company to expand its tractor and motor grader production as well as to permit extensive rearrangement of production lines for greater efficiency and capacity. Still another structure with 45,000 sq ft of space will provide more extensive heat treating facilities. Company officials estimate that the part of the program which will be completed this year will involve $20 million.

Deere Acquires Another Plant

Deere & Co., second largest producer, is starting limited production of tractors in a recently completed new plant in Dubuque, which was erected at a cost of $11 million. This plant is being devoted to the production of the new Model M, a small size unit whcih is a 1947 addition to the tractor line. In full operation this plant will have an annual output of 15,000. In addition farm power units will be made for stationary use and for powering small combines. The side of this building has ample space for future expansion, but no immediate plans have been announced.

Meanwhile the company is making considerable improvement in its Waterloo plant, designed to increase its annual capacity. Expansion of implement manufacturing facilities, to provide the necessary production for the new tractor output from Dubuque are also under way.

Ford Tractor Production

For the next few months at least the tractor operations of the Ford Motor Co. will be watched with considerable interest. Since 1939 the company has been manufacturing the Ford-Ferguson tractor under contract for Harry Ferguson, Inc. Some months ago Ford announced that the contract would be terminated July 1, after which the company would manufacture its own tractor.

Subsequently, Dearborn Motors Corp. was established to distribute the Ford tractor. The Ferguson system which has been an integral part of the Ford tractor is a unique system of hydraulic depth control for implements permitting integration of the tractor and implement for operation as a single unit. The new improved Ford tractor with an improved hydraulic system for implement control was

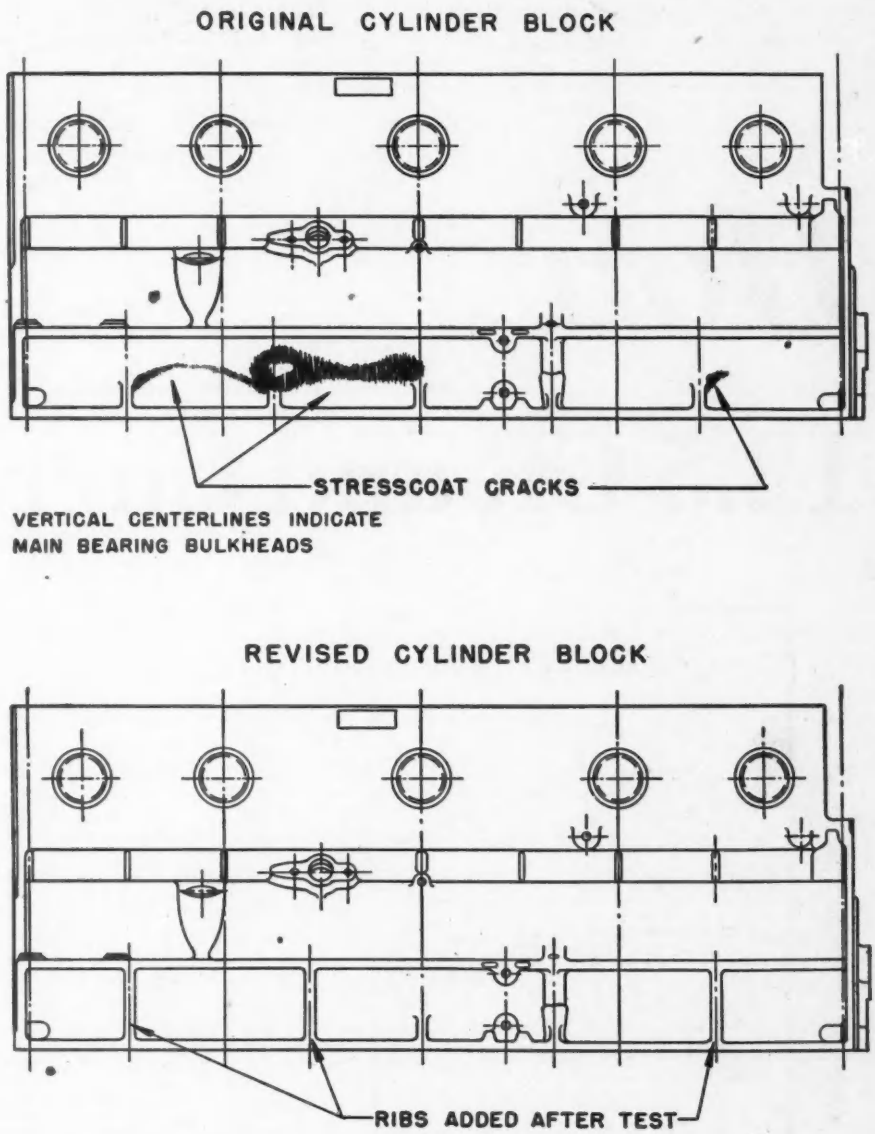
(*Turn to page* 54, *please*)

Car Frame and Crankcase Improved by Brittle Coating Tests

THE experience of the Research Department of Packard Motor Car Co., since the resumption of motor car production has shown that stress analysis with the brittle lacquer coatings developed by the Stress Coat Division of Magnaflux Corp., not only is a short cut to optimum design but can be easily justified for the study of certain vital elements of the vehicle. In a short space of time Packard has employed the technique to good advantage in the design of the chassis frame for the new Super-Eight Convertible and in the refinement of the crankcase section of the cylinder block for the new Super-Eight engine.

As the facilities of the laboratory are increased this department expects to extend its studies to axle housings, transmission cases and parts, engine structure and other selected parts. Stress analysis has proved that the conventional concept of product design may fail to yield best results. In many instances ribs and stiffeners instead of being strengthening members actually induce stress concentration and become stress intensifiers. Most important, the technique points up a better utilization of material. A redistribution of metal frequently not only reduces the total weight of parts but gives the lighter parts much greater durability.

Therein lies the virtue of the principle. In motor vehicle design it is not necessary to pare weight to the limit as in aircraft. The reduction of only a pound or a few pounds of metal here and there, however, will yield enormous economies in a passenger car plant producing a hundred thousand or more cars per year. Apart from improved product design such savings may pay for the best equipped and best manned laboratory in the industry.

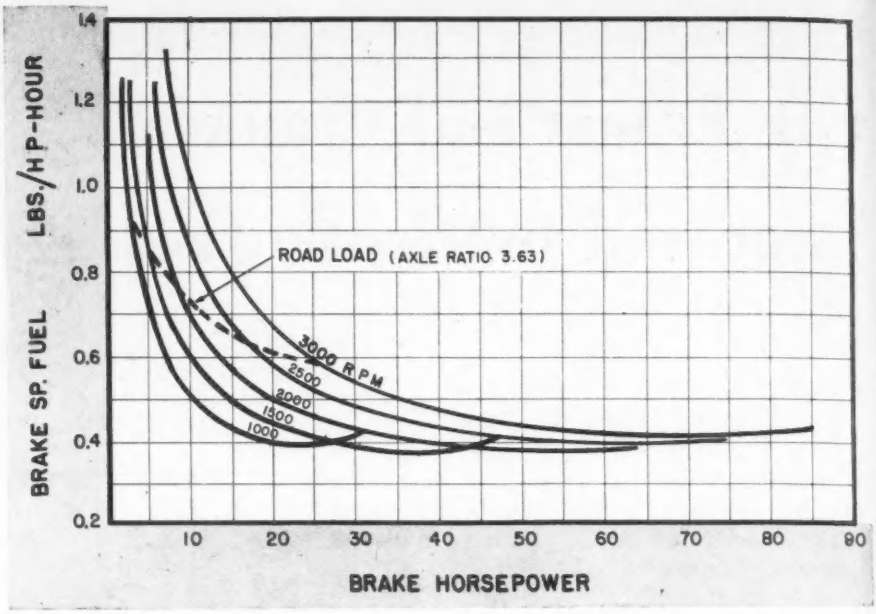


(Upper) Stresscoat cracks show the location of strain areas in the crankcase section of the Packard Super Eight cylinder block. These strain areas caused engine vibration and noise at moderate speed.

(Lower) Introduction of substantial ribs at these areas eliminates engine vibration and noise.

Let us consider two major examples of analysis recently completed at Packard. Months before the new convertible was ready for announcement it was decided to study the chassis frame with a view to improvement in torsional rigidity. This was in line with common

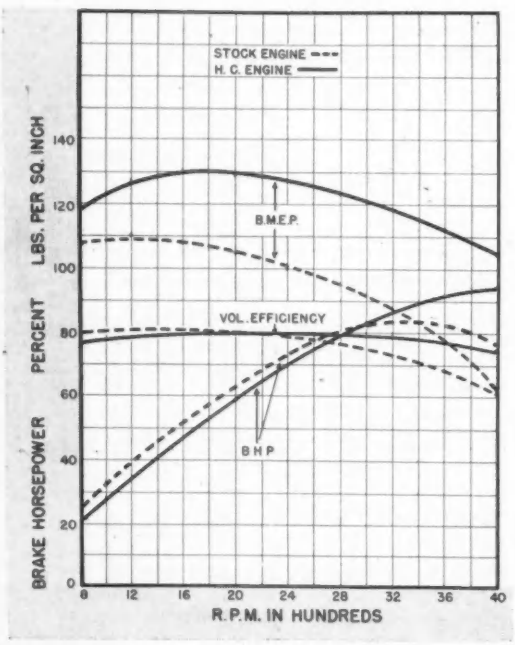
(*Turn to page* 60, *please*)

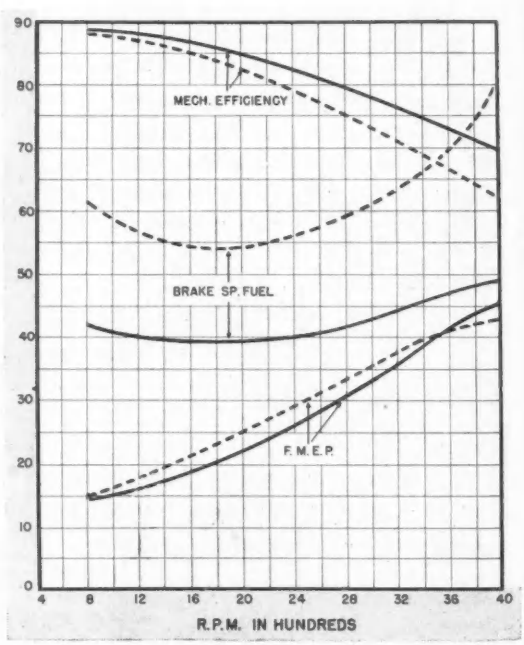


These curves give fuel consumption of the high-compression engine at fractional loads from 1000 to 3000 rpm, as installed in a 1946 Oldsmobile car. The calculated road load has been spotted at each speed and a dotted curve drawn which indicates the road-load specific fuel consumption

How

12.5 CR and Current Stock





Comparison of the high-compression engine's performance with that of a 1946 stock Oldsmobile engine, the latter operating on regular grade gasoline. The bhp of the two engines are comparable except for slight differences as shown on the curves. The bmep of the high-compression engine is much higher than that of the 6.4 to 1 CR stock engine, the former having a displacement of 181 cu in. as compared with 238 cu in. for the stock powerplant. Volumetric efficiency of the high-compression engine is as good or better than the stock engine, showing that there is no restriction to engine breathing

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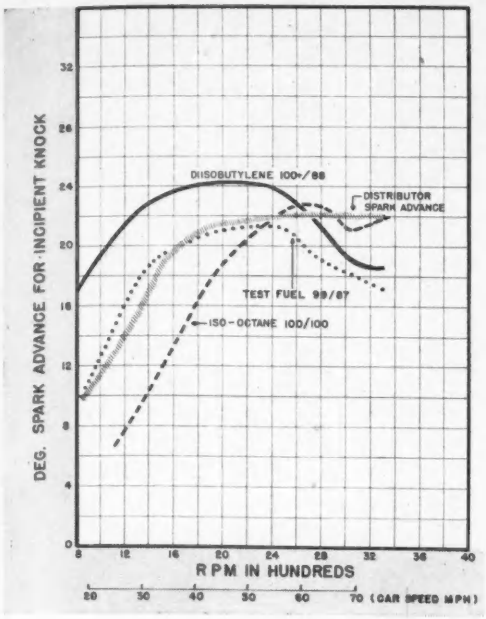
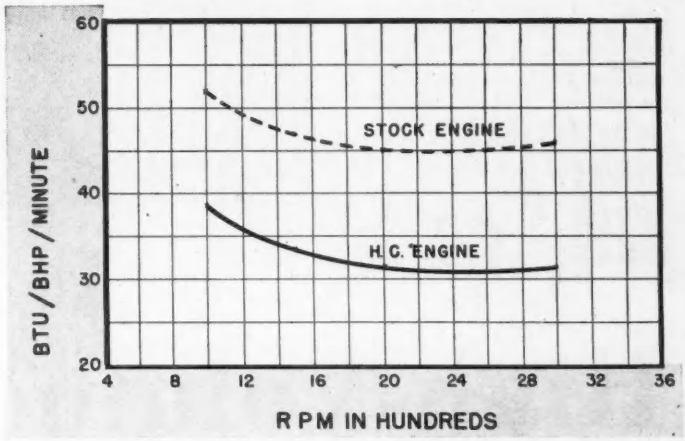
Full throttle performance of the two engines is shown above. The friction mep and mechanical efficiency for the high-compression engine prove that it is possible to design a high-compression engine without excessive friction, a fact which bears out Diesel experience. The high-compression engine curves are shown by the solid lines, and the stock engine curves by the dotted lines



These curves are representative of the performance of three widely different types of fuels in the experimental engine. Diisobutylene, an extremely sensitive fuel as indicated by its research octane number of 100+, is equivalent to iso-octane plus 0.5 milliliter of tetraethyl lead, and has an ASTM octane number of 88. Iso-octane is a fuel of zero sensitivity. The test fuel was a sensitive type of gasoline produced by catalytic cracking. With 1.5 milliliters of tetraethyl lead, it had a research octane number of 99 and an ASTM octane number of 85. It is understood that such a fuel could be made and sold in large quantities at a comparatively small premium

A heat comparison of the two engines is also shown in these curves of heat rejection to the cooling water. Heat rejection for the high-compression engine is almost 30 per cent lower than for the stock engine



Engines

Compare in Performance

PERFORMANCE curves and other data on General Motors Research Laboratories' high-compression engine for passenger-car use, comparing this six cylinder spark-ignition powerplant with a stock 1946 Oldsmobile six-cylinder engine, are given on these two pages. As described in the June 1 issue of AUTOMOTIVE AND AVIATION INDUSTRIES, on page 38, the GMRL engine operates at a compression ratio of 12.5 to 1, using 99 octane (research) fuel. It has an overhead valve arrangement, and a displacement of 181 cu in. with a 3⅜ in. bore and 3⅜ in. stroke. This material was abstracted from the paper, "More Efficient Utilization of Fuels" by Charles F. Kettering, former head of General Motors Research Laboratories Div., which was presented at the recent SAE summer meeting.

This table shows a heat balance comparison of the stock engine and high-compression engine at 1000 and 3000 rpm. Throughout the speed range, the high-compression engine loses less heat per hp through the exhaust and cooling water, and more heat is utilized in producing power

	HIGH COMPRESSION ENGINE		1946 PRODUCTION ENGINE	
	1000 RPM	3000 RPM	1000 RPM	3000 RPM
PART OF FUEL HEAT IN FHP-PERCENT	3.5	8.2	3.5	7.9
PART OF FUEL HEAT IN BHP-PERCENT	33.2*	32.8	24.9	23.3
PART OF FUEL HEAT IN WATER—PERCENT	30.1	24.2	29.1	25.4
BALANCE OF FUEL HEAT HEAT—PERCENT	32.2	34.8	42.5	43.4

By Joseph Geschelin

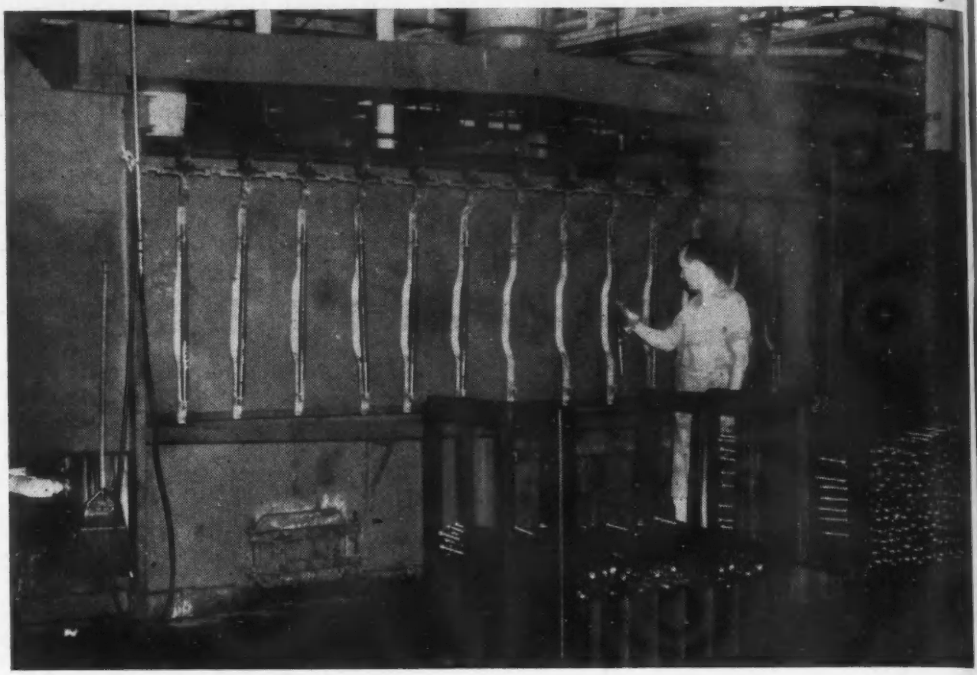
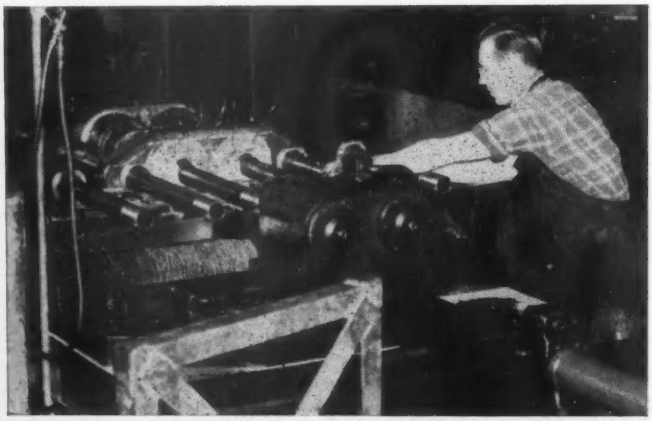


Fig. 1 — This Niagara washer for axle shafts features a built-in monorail conveyor with an exposed section to facilitate loading and unloading

High-Volume Production of

THE Salisbury Axle Works, Division of Dana Corp., Fort Wayne, Ind., utilizes advanced and unique operation methods for high-volume production of passenger car axles. Two basic types of axles are manufactured, and since the same methods are employed for both, the layout consists of two parallel and compact machine lines differing only in tooling. Work is transferred from one operation to another by means of chutes and gravity roller conveyors, the usual monorail conveyors being used only at certain points in the Salisbury plant at Fort Wayne.

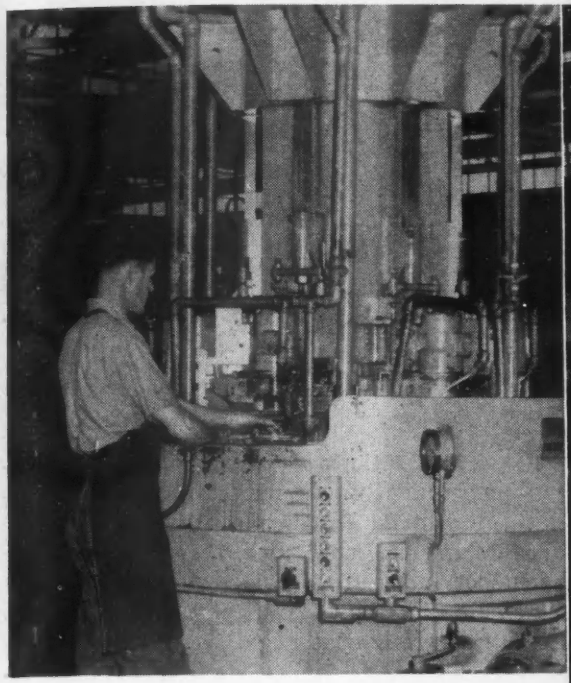


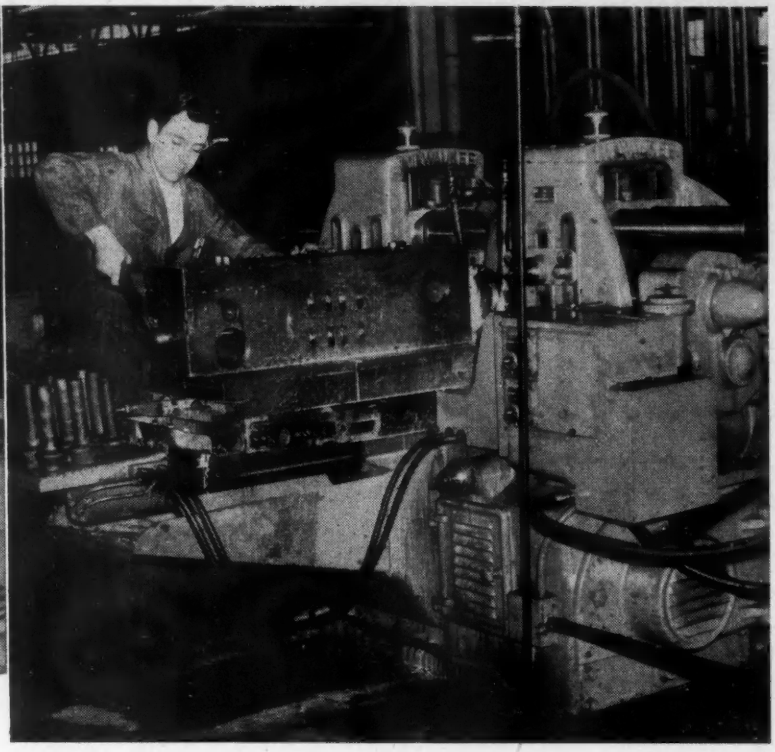
Apart from tricks in machine operations, Salisbury offers some outstanding examples of special processes. For example, here is the first example of a unique automatic induction hardening machine for axle shafts, using progressive heating and quenching. This machine was built by Snyder. Each unit has six stations, each with a single inductor block through which the shaft is moved downward at a pre-determined rate by means of a box cam on the periphery of the lower end of the machine. The shaft is mounted with the tapered end up and is hardened except the end, which is threaded later and is therefore left soft.

The Lithium furnace has been adopted for the annealing of all gear forgings. Function of the Lithium furnace is to anneal the work in a non-scaling atmosphere, taking parts directly as received with forging scale. In the heating cycle the forging scale, although not removed, is reduced to the extent that it is relatively soft and spongy and can be readily cut by tools in subsequent machining operations. The adoption of this method has eliminated all of the usual shot-blasting operations.

Although castings and stampings which require

Fig. 4—One of a battery of horizontal Ex-Cell-O machines tooled for drilling flange holes in axle tubes. As shown, two pieces are drilled at one time. Feature of these machines is the unique fixture for transferring the work





n of Passenger Car Axles

Fig. 2 — This Bullard Contin-U-Matic for differential case machining finishes both hubs and the flange in one setting. It is said to be the latest type machine of its kind

Fig. 3—Shown here is the Milwaukee Duplex mill arrangement for milling and centering drive pinion forgings

sealing or surface paint are specified to be free from rust, occasionally they are received in a rusted condition. In such cases rust is removed quickly and effectively by the ACP Deoxidine cleaning treatment. For this purpose there is a conveyorized tank arrangement in which the parts are hung on a monorail and transported through the Deoxidine tank, followed by a water rinse in another tank.

While a number of Niagara alkali washing machines are used, one of the most interesting is the one illustrated in Fig. 1. Used for cleaning axle shafts, its unusual feature is the built-in monorail conveyor on which the shafts are mounted for the cleaning cycle. The operator loads and unloads at one station.

Several interesting applications have been made of the photo-electric cell. One of these operates a counter on the conveyor line carrying ring gears from the grinders to the Niagara washer and thence to the Gleasons. This provides an accurate check on the incentive pay system.

Among the largest pieces of equipment is a new Federal projection welding machine which welds the plugs keying the axle tube to the housing after assembly. There are four plugs at each end, welding being done first on one end then on the other. The enormous size of this machine comes from the fact that it handles two axles at a time, one on each side of the welder.

Salisbury employs various kinds of electro-plating on certain of the axle parts to give them anti-scuff properties. For instance, the bevel pinions and side gears that go into the differential case, as well as the cross shaft, are given a 0.0002-0.0004 in. coating of copper. Thrust washers used in the axles assembly are tin plated, and the block which serves as a spacer between the ends of the axle shafts is treated with Parco-Lubrite.

Among the unusual pieces of machine tool equipment is a large group of special Baker drills, one of these in the differential case line being a large four-station unit for boring, chamfering and facing. Here, too, is a Bullard Contin-U-Matic machine, shown in Fig. 2, which finishes both hubs and the flange in one setting. This machine has six stations and finishes each piece at the individual station while going through one rotation of the table.

The axle shaft presents many interesting process features. In the rough the shafts are milled accurately to length in a horizontal Davis and Thompson Roto-Matic with a barrel fixture holding 15 pieces at a time. As each shaft is about to enter the milling station.

(*Turn to page* 67, *please*)

Three New

Photoelectric

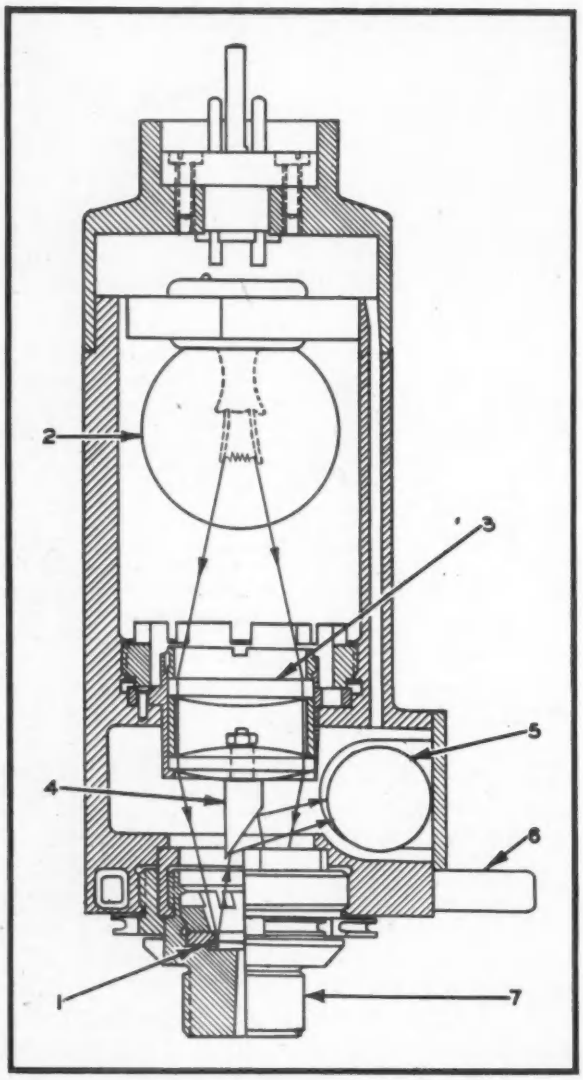


Fig. 1 (Above) Cross-section of photoelectric pressure pickup

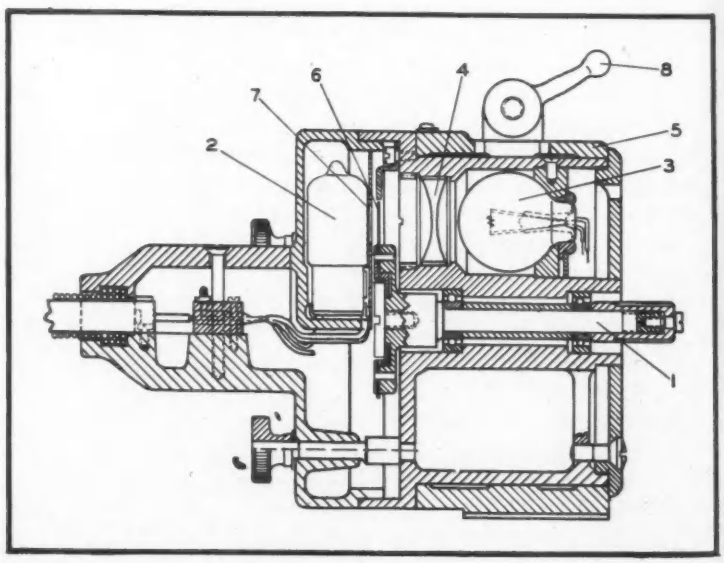
Fig. 2 (Right) Cross-section of abscissa pickup for pressure indicator

RECENT investigations of wartime engineering developments in Europe, carried out by the Technical Industrial Intelligence Division, Department of Commerce, uncovered three photoelectric instruments of interesting design, and which are of particular value in high-speed engine research. Two of these, a pressure indicator and a torsiograph, were developed in Germany; and the other, an injection needle valve lift indicator, is of British origin.

Photoelectric Pressure Indicator

The photoelectric pressure indicator was designed about 1940 by H. Maihak A. G., Hamburg. It is similar in operation to the Labarthe indicator which was described in the Dec. 9, 1933, and Feb. 10, 1934, issues of AUTOMOTIVE INDUSTRIES. However, the novelty of the Maihak instrument is contained in its several design refinements and in its development as a commercial article which can be readily mounted on any engine. It uses two pickups: one for the pressure; and the other for the abscissa variable, either crank angle or piston stroke. A cathode-ray oscillograph incorporates an amplifier and the power circuits.

The pressure pickup, Fig. 1, contains a pressure responsive metal diaphragm 1, which on its under side is acted upon by the variable engine pressure and is deflected by it into a spherical segment of greater or



By Kalman J. DeJuhasz
Professor of Engineering Research,
The Pennsylvania State College

Instruments

for High-Speed Engine Research

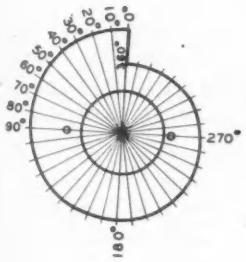


Fig. 3a (Left) Masking disc for crank angle abscissa of pressure indicator

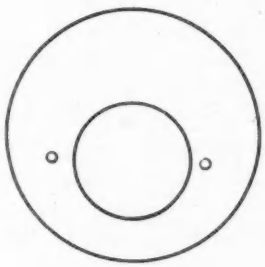


Fig. 3b (Right) Masking disc for piston stroke abscissa of pressure indicator

lesser radius as a function of the engine pressure. The upper side of the diaphragm is polished to form a reflecting mirror surface. A light beam from an incandescent lamp (headlight bulb) 2, passing through a lens system 3 is directed upon the mirror surface 1, and is reflected by it to the stationary mirror 4, and hence to the photo cell 5. Depending on the convexity of the mirror 1, the intensity of light reflected by it, and thus the amount of light received by the photo cell varies as a function of the engine pressure. The photoelectric current passed by the photo cell is thus a function of the engine pressure and is, within a considerable range, proportional to it. The current output of the photo cell is fed to the receiver instrument and, after suitable amplification, it acts on the electron beam of the cathode ray oscillograph, deflecting it in a vertical direction. Thus the vertical excursions of the light spot on the oscillograph screen will be proportional to the engine pressure. The entire pickup with light source, optical system and photo cell forms a compact unit the bottom portion of which, near the diaphragm, is water cooled (inlet and outlet 6), and terminates in a spark-plug threaded boss 7 for attachment to the engine cylinder.

The pickup for the abscissa variable is shown in Fig. 2. This consists, essentially, of a shaft 1 driven by, or in synchronism with, the engine crankshaft. This shaft carries a masking disc 6 which partially covers up and thereby changes the length of a narrow aperture 7 located in front of photo cell 2 which receives through the aperture a beam of light produced by an incandescent lamp 3 and a lens system 4. The current output of this photo cell, after amplification, is fed to the cathode ray oscillograph, and deflects its beam in a horizontal direction. If the desired abscissa is the crank angle, then the masking disc must have the form of an Archimedean spiral, as shown in Fig. 3a. If the desired abscissa is the engine piston travel, then the masking disc has to be an eccentric circle, Fig. 3b, or, for more accurate representation of the piston motion, an ellipse-like figure which can be readily constructed if the ratio of connecting rod length to crank radius existing in the engine is taken into consideration.

For the adjustment of the correct phasing of the abscissa pickup in relation to the dead-center phase of

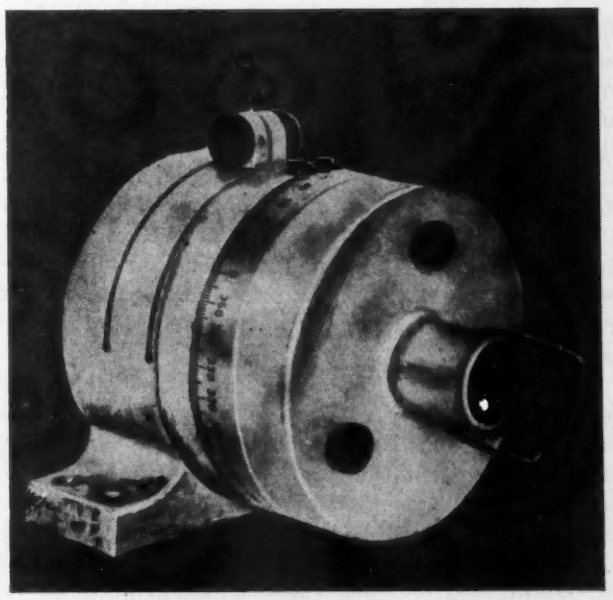


Fig. 4—In this photo is shown the abscissa pickup for the pressure indicator

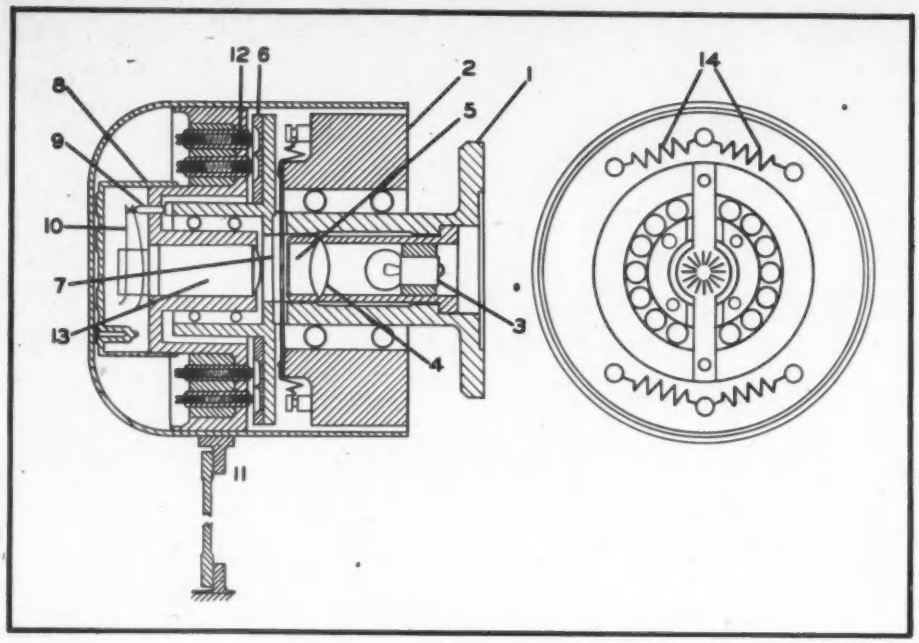


Fig. 5—Sectional drawing of photoelectric torsiograph.

the engine, the entire unit comprising the photo cell and light source assembly can be rotated about the shaft 1 (Fig. 2) as axis and clamped in the stationary holding frame 5 by handle 8. For aid in the accurate adjustment, a degree graduation is provided on periphery of the unit, and an index mark on the stationary frame. Fig. 4 shows this abscissa pickup in its assembled state.

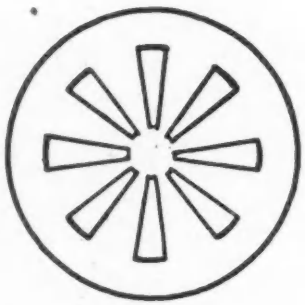


Fig. 6—Radial apertures in torsiograph.

Photoelectric Torsiograph

This torsiograph was originated by Dr.-Ing. Kurt Hoppe and an experimental model of it was used at the Berlin engineering university. In this instrument the deviations of the actual rotational motion of the engine shaft end from the mean value of rotational motion, i.e., the angular excursions of the torsional vibration, are converted into proportional variations of a light beam, and are recorded on an oscillograph screen by photoelectric means.

The instrument (Fig. 5) comprises: a hollow shaft element 1 bolted by a flange to the end-flange of the engine crankshaft and which, therefore, participates in the uneven rotation of the engine shaft; and an inertia wheel 2 mounted on this hollow shaft on ball bearings and coupled to the latter by means of springs 14, as a result of which the inertia wheel will rotate at an approximately even speed corresponding to the mean speed of rotation of the engine shaft. These elements, of course, are common to all torsiographs.

The novelty resides in the method of measuring the angular displacement of the inertia wheel relative to the hollow shaft. For this purpose a light source, a small electric bulb 3 is mounted within the hollow shaft and rotates with it, the current being conducted to it by means of brushes 12 and contact rings 6. The light from bulb 3 is concentrated into a parallel beam by the lens 4, and is received by the photo cell 13 mounted in the stationary housing coaxially with the shaft. The center portions of both the flanged hollow shaft and of the inertia wheel are provided with a number of radial apertures, Fig. 6, the two sets of apertures being at close proximity to one another. When the engine is at rest or rotating at uniform speed, the two sets of apertures register with each other to the extent of their half-width. An angular displacement either way will, therefore, increase or decrease the effective free area through which the light beam passes. By virtue of this arrangement the amount of light received by the photo cell and the current passing through the photo cell will be a function of, and under certain conditions and within a certain range, will be proportional to the effective area of the light aperture, i.e., to the angular displacement of the two members relative to one another. The current output of the photo cell is amplified and is fed to a loop oscillograph.

An axial cam 8 is formed on the rotating element which actuates, by means of the slideable tappet 9, a contactor 10, to indicate each revolution on the oscillograph screen. The arm 11 serves to anchor the stationary part of the instrument and prevent its rotation.

An advantage claimed for this instrument is the possibility of static calibration which can be accomplished with great accuracy (to 0.02 deg) by a mi-

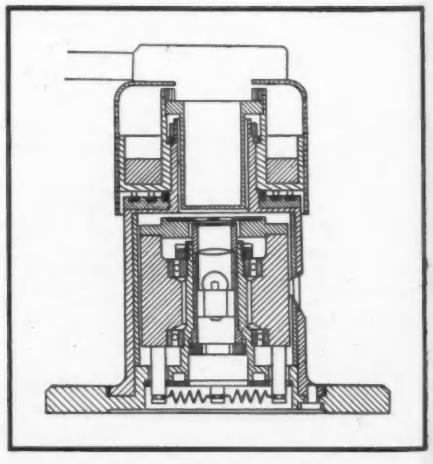


Fig. 7—Improved design of torsiograph.

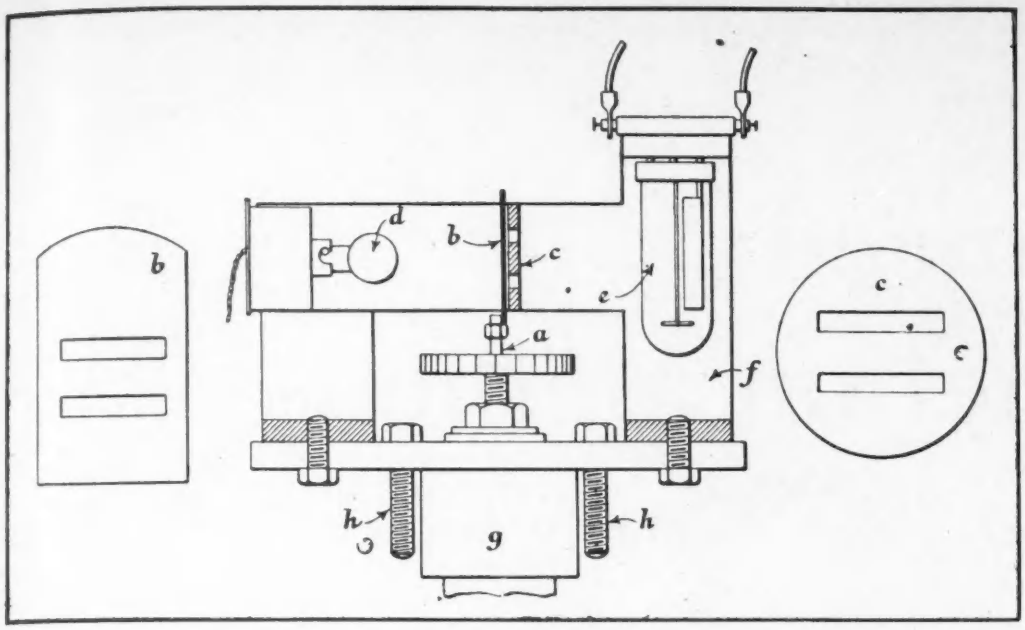


Fig. 8 (Left) Photoelectric needle lift indicator

Fig. 9 (Below) Circuit diagram for needle valve lift indicator

crometer screw arrangement, whereby the inertia wheel can be displaced relatively to the hollow shaft. The total range of displacement is limited by stops to ± 3 deg.

This experimental unit performed basically as intended, but was not fully satisfactory owing to two main defects. First, the light beam was not homogeneous because the filament is not a true point light source and, therefore, the beam has different intensities at different points. Second, the photo cell also

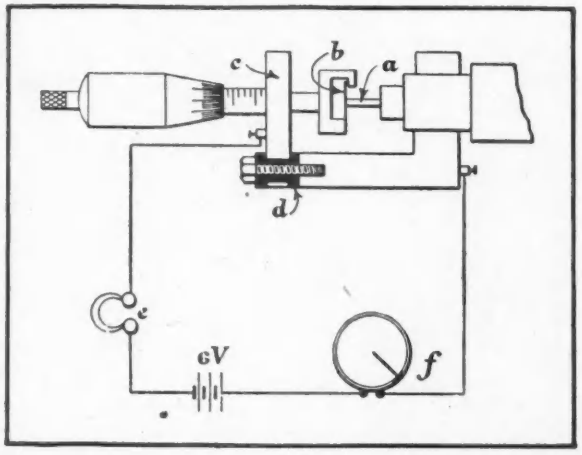
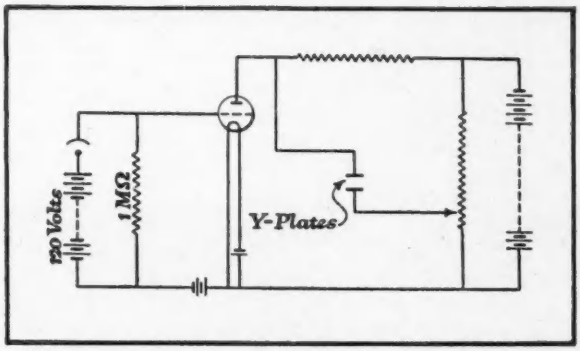


Fig. 10—Point-by-point needle lift indicator

had unequal responses at the various points of cathode surface, which latter was also partially shaded by the anode. Owing to these influences, the instrument indicated about 0.1 deg vibration even when it was attached to an electric motor, when actually no torsional vibration was present.

On the basis of these experiences, a new type of photo cell was developed having a flat cathode with very even coating, and a ring-shaped anode located outside of the light beam so that no shadow was thrown on the cathode.



Also, a second model of the torsiograph was designed, Fig. 7, having very small dimensions, 1.65 in. diam by 2.95 in. long. The hollow shaft, which encloses the inertia wheel, is magnetized and is lined with a copper sleeve, acting as an eddy current brake on the inertia wheel, producing a damping effect. The static calibration is facilitated by a window in the hollow shaft, marked with a vernier scale, which can be read against the degree graduation on the periphery of the inertia wheel, the two being displaceable relatively to each other by means of a micrometric screw. In order to bring the two sets of light apertures into the proper relationship at the zero position, the anchoring pins for the helical springs are mounted on a ring which can be turned relative to the hollow shaft and clamped in the proper position.

All the electrical lead-in wires are contained in a rigid tube which serves also as a rotation -preventing arm for the stationary part of the instrument.

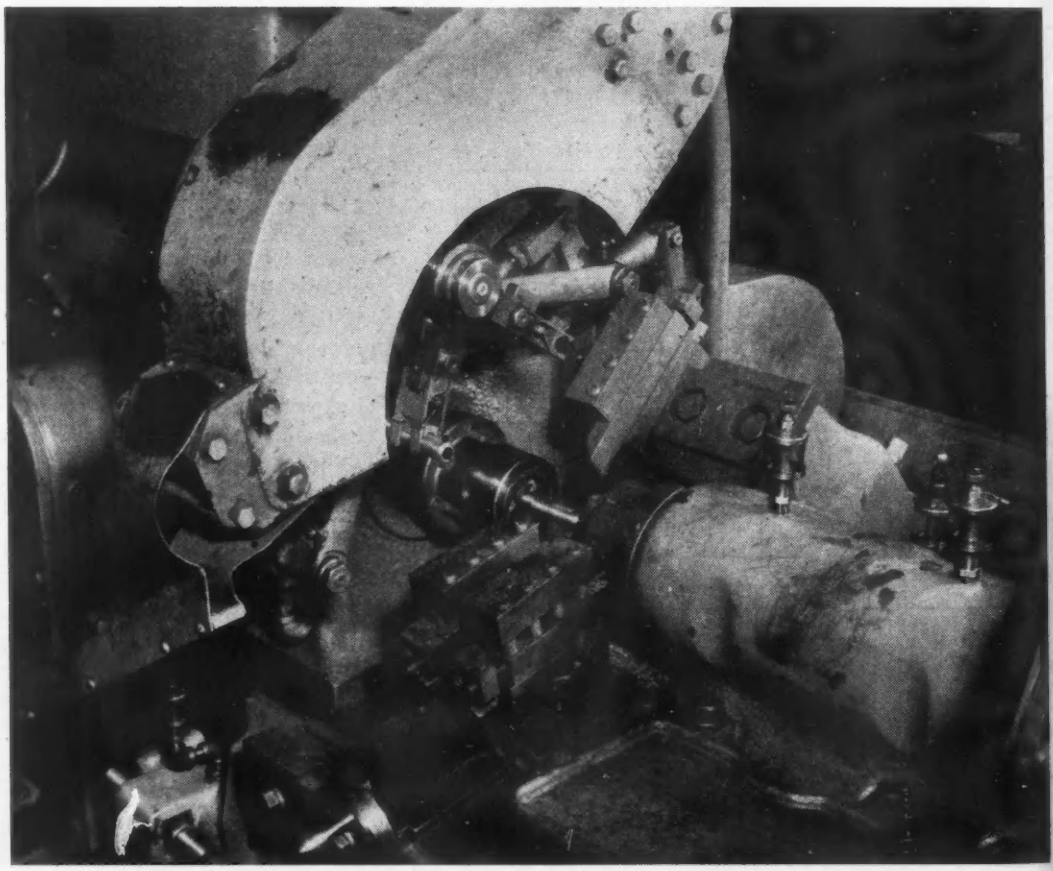
Injection Needle Valve Lift Indicator

This instrument was developed by Dr. Norman Kendall at King's College, London, during the war and may be little known in this country. The general arrangement is shown in Fig. 8, in which *g* is the nozzle body, *a* an extension rod fastened to the needle valve, *d* is the light source and *e* the photoelectric cell. To the extension rod *a* is fastened a light aluminum plate

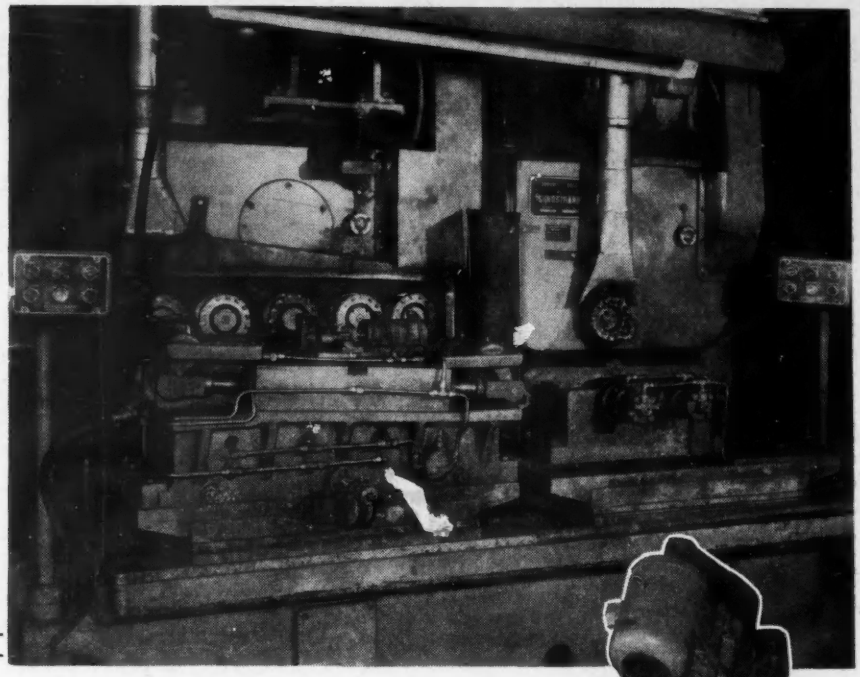
(*Turn to page* 60, *please*)

Advanced Production Methods

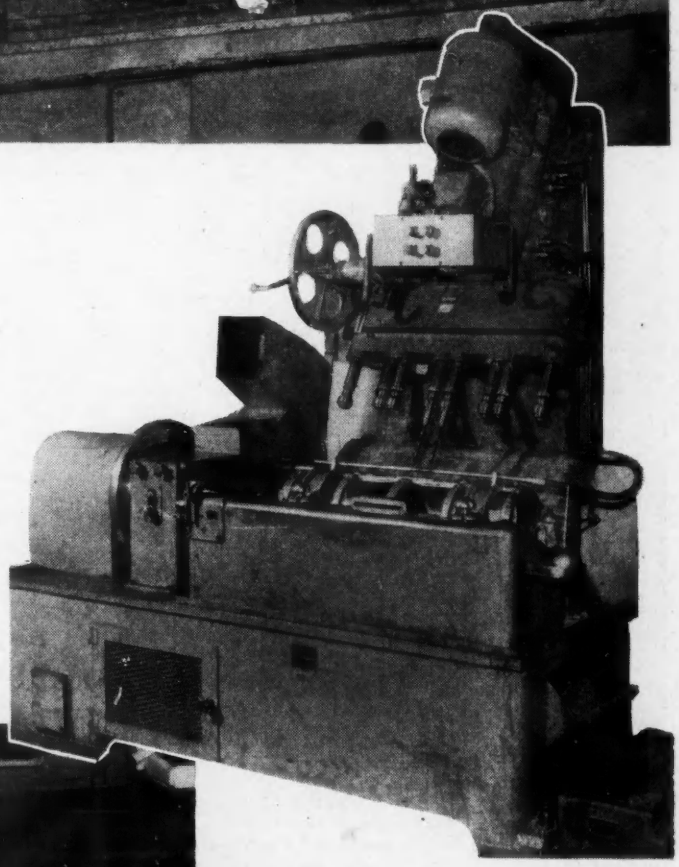
Used at Buick Engine Plant



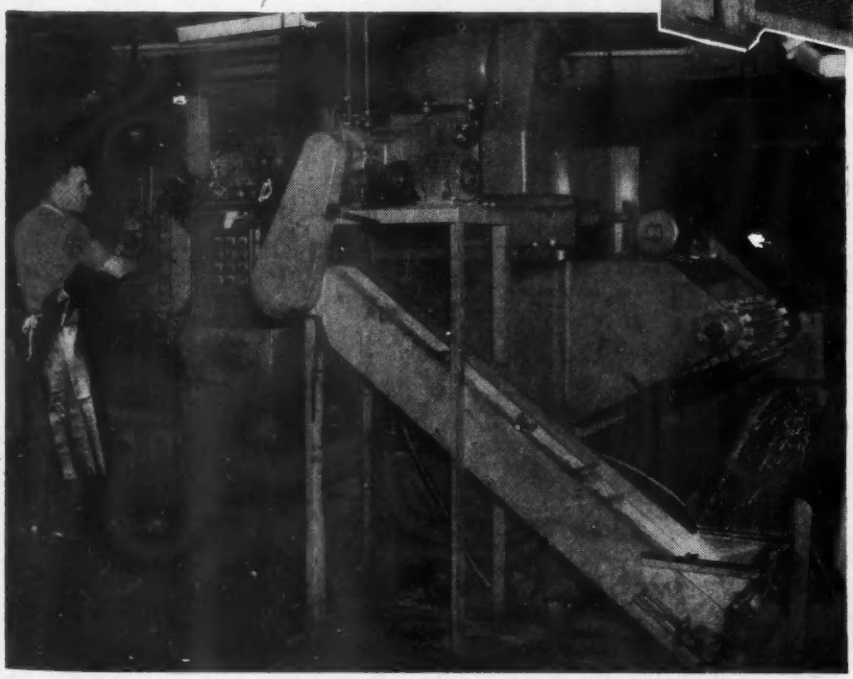
Interesting example of advanced production methods at Buick is the extremely fast turning of valve-stem guides on a battery of four 8 x 21 Fay automatic lathes. The operation consists of turning two steps on the outside diameter, and chamfering and facing of the end in one setting. The Fay automatic is equipped with hopper feed and automatic finger loading and unloading. In the former method, using a conventional 1 x 18 lathe with hopper feed, output was slightly over half of the present method



Buick has developed a fast procedure for milling intake and exhaust manifold pads through the adoption of massive rise-and-fall mills built for that purpose by Sundstrand. The machine shown here is for milling exhaust manifold ports, and features two rows of milling cutters—one row for roughing, the other for finishing. The entire operation is performed in a single setting



(Below) Another example of improved methods at Buick is this machine for slotting the pinch bolt hole in the upper end of a connection rod. Built by H. R. Kreuger, this is a four-station horizontal unit fitted with a fixture holding four rods at each station. Rods are loaded in the first station and are indexed to the second station where a tool block containing four saws cuts the slot in one side of the four rods. The second sawing station, located 90 deg from the first, cuts the slot in the opposite side. The bottom station is for automatic unloading, the parts being unclamped automatically and dumped into a chute in the bed of the machine which carries them into a hopper. This machine has doubled productive efficiency as contrasted with the previous method which used a plain milling machine with an indexing fixture in which the rods were turned manually



(Above)
Crankshaft balancing, one of the most exacting operations in the engine department, has been greatly improved and speeded at Buick by the introduction of a new horizontal-type balancing machine developed by General Motors Research Laboratories. Noteworthy feature of this machine is the installation of an angular eight-spindle drilling head, which permits drilling balance holes in from one to eight key locations without removing the shaft from the machine. This also facilitates rechecking balance correction

SAE SPOTLIGHTS at FRENCH LICK

SAE President C. E. Frudden, Allis-Chalmers consulting engineer, presides at the business session of SAE summer meeting at French Lick, Ind. During the session 34 proposed changes to the SAE constitution were presented for first reading. George A. Delaney, chairman of the Constitution Committee, explained them

Charles F. Kettering (left) relates to Dr. Robert E. Wilson, chairman of the board, Standard Oil Co. (Ind.), some of the important design details in the new high compression passenger car engine developed at the General Motors Research Laboratories in Detroit. A capacity crowd of 700 heard Kettering review the development of this engine on June 4 when he presented his paper on the more efficient utilization of fuels

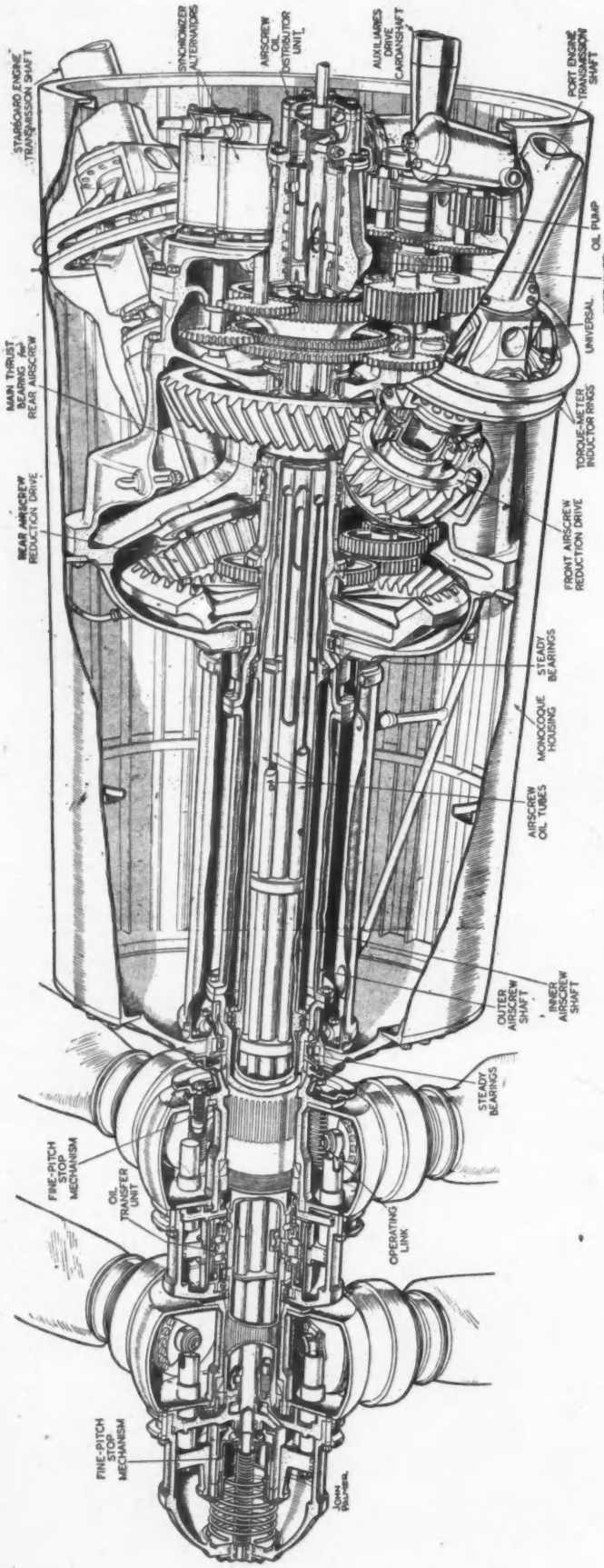
These Sealed Power singers won the barber shop quartet competition during the family album party. Second prize went to the Detroit Section quartet

(Left) This group of engineers, who directed the development of General Motors Research high compression engine, were present at the French Lick meeting to explain its design to SAE engineers. In the front row (left to right) are T. O. Richards, R. A. Richardson and A. D. MacDuffie. Rear row (left to right): John M. Campbell, A. F. Underwood, Charles F. Kettering, J. P. Brannon, Darl F. Caris and Wheeler G. Lovell

(Right) After presenting a paper on the thermodynamics of vapor powerplants for buses and trucks, E. B. Neil demonstrated to the engineers a Janitrol high output aircraft type space heater to show how quickly intense heat can be produced with modern equipment

(Below) Competition was keen for the prizes at the field day games

Unusual *Bristol Gearing*



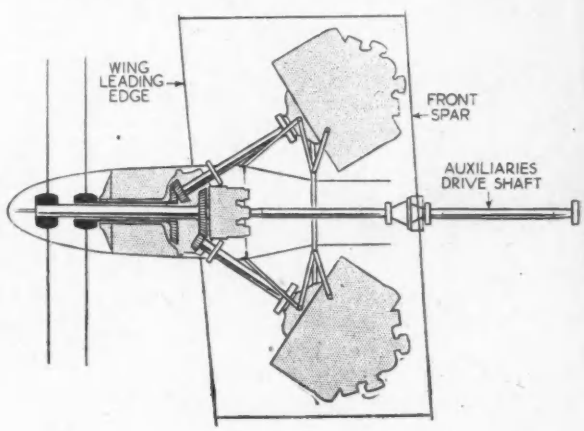
SHOWN here in a cutaway drawing is the unusual arrangement of the propeller drive and reduction gearing used on the powerplant for the Bristol 167, the British 143-ton transoceanic passenger plane now under construction that is to be powered by four twin-engined units, each engine being rated at 2400 hp.

The co-axial contra-rotating propellers are driven by separate engines horizontally placed with their crankshafts at an angle of 64 deg. The transmission shafts carry reduction pinions meshing with larger bevel gears on the respective propeller shafts. The outer propeller shaft drives the rear propeller and the inner shaft the front propeller. The gears driving the inner shaft are of external spiral bevel type, while those of the outer shaft consist of an internal bevel gear and a pinion both rotating in the same direction, in contrast to the reversal which takes place in the iner shaft drive. The diagrammatic sketch shows the plan of paired engine installation.

Manufacture of these reduction gears presented some unusual problems because there was no known machine tool capable of generating an involute tooth-form on an internal bevel of the necessary included angle. However, this was accomplished by using the bed and reciprocating mechanism of an existing shaper, and equipping it with a special dividing-head and dividing plate. Then the internal teeth were roughed out with a straight cutter, shaped with a form cutter and after heat treating, bore and face grinding, were finished with a grinding head.

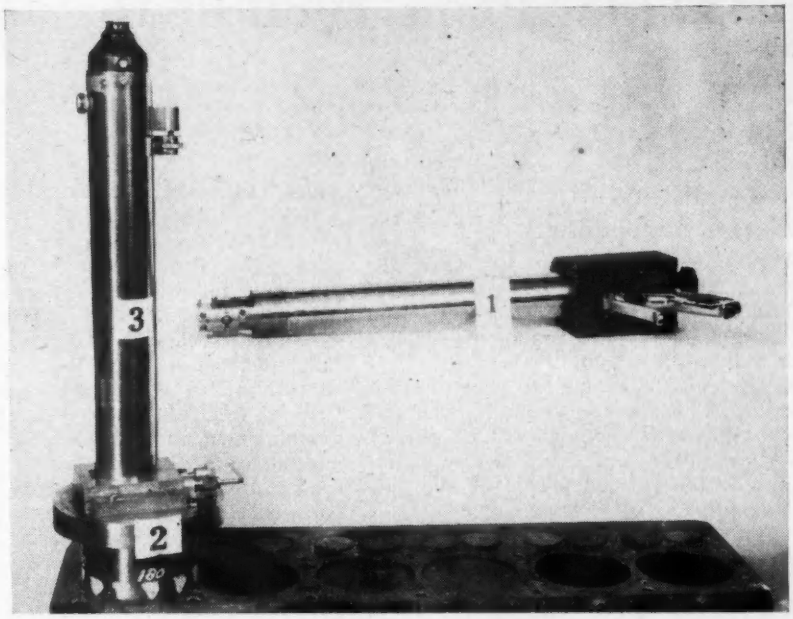
The gears were machined from solid discs of nickel-chrome case-hardened steel which had been upset to give a grain disposition best suited to withstand the stresses imposed. To control distortion intermediate annealing and normalizing was carried out after the earlier machining operations; and the final heat treatment was controlled, as far as possible, by the use of quenching fixtures.

(The two drawings on this page are reproduced by courtesy of *Aircraft Production*, London.)

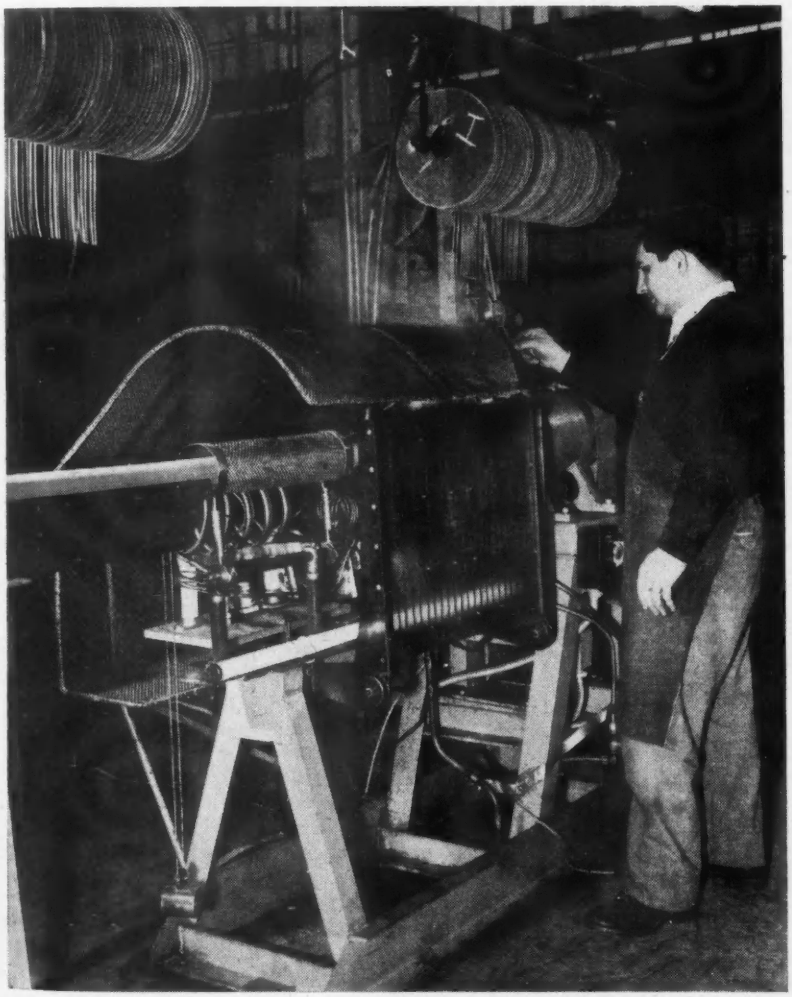


For Small Measurements of Cylinder Wear

THIS instrument is used to determine minute amounts of cylinder wear in an automobile engine. Developed by the National Bureau of Standards, it consists of a diamond pointed indenting tool (1), an indentation locator (2), and a microscope (3). The indenting tool makes a small mark on the cylinder wall and by measuring the length of this mark before and after engine operation, amount of cylinder wear can be determined. This instrument was described in the Feb. 1, 1947, issue of AUTOMOTIVE AND AVIATION INDUSTRIES, page 33.



Electronic Heating Setup Increases Filter Production



A UNIQUE application of high-frequency dielectric heating is found in this special machine designed by Skinner Purifiers, Inc., and used by it in conjunction with a Thermonic electronic cabinet for polymerizing resin-impregnated paper in the production of gasoline, oil and air filters. These filters are made of standard crepe paper impregnated with phenolic resin. Polymerization, which is necessary to achieve a permanency of strength and form in the filter, is accomplished by a high-frequency modulated field within two cylindrical copper screens fitted over a steel mandrel on which is wound strips of the impregnated paper. In this photo the paper ribbon is being fed from a drum onto the steel mandrel. One of the copper screens can be seen inside the machine. The speed at which the paper is fed onto the mandrel is adjustable by means of a manually controlled rheostat. Temperature control is obtained through a tuning device for the electronic circuit which varies the mutual inductance of a group of coils arranged on the bed of the machine. This dielectric heating machine is said to result in more uniform polymerization and a higher rate of production.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56.

E-1—Milling Cutter Sharpener

A machine of unique structure, for the sharpening of contour-ground form milling cutters, has recently been brought out by the Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Designed to enable the user of form milling cutters to benefit by the advantages of the contour-ground type of cutter, cutters are sharpened by grinding on the formed profile of the cutting edge.

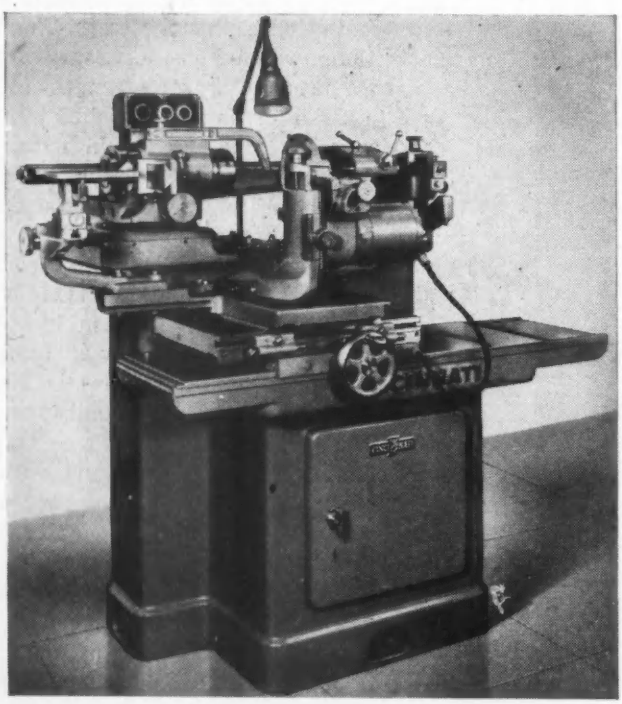
This new machine generates contours on the cutter teeth by accurately duplicating a metal master template of the desired shape. Convex or concave radii, angular faces, and combinations of these elements may all be produced with accuracy.

Tracing action of the machine in following the master template is hand controlled and practically effortless, as the wheelhead unit is carried on an anti-friction type of mounting which provides "free" longitudinal, transverse, and swivel movements.

The base of the wheelhead carries a follower pin which is held in contact with the template as the grinding wheel is guided along the tooth being sharpened. The follower pin is located on the axis of rotation of the wheelhead swivel base and the grinding wheel is trued to a matching radius which lies directly above, and in line with, the contacting surface of the follower pin. Thus all movements of the pin as it follows the master template are duplicated in the cutter by the grinding wheel.

In addition to its anti-friction slide mounting, the wheelhead is provided with a vertical positioning slide for grinding clearance or "back-off" angles, and a transverse positioning slide to compensate for wheel wear. The entire wheelhead unit is carried on a slide, provided with handwheel control, to shift it into the truing position at the right-hand side of the machine. The grinding wheel is trued to a radius by the use of the swivel base movement and gages are supplied for positioning the diamond to generate 1/16 in. and ⅛ in. radii on the grinding wheel. A gage is also provided to accurately locate the center of wheelhead swivel with reference to the truing diamond.

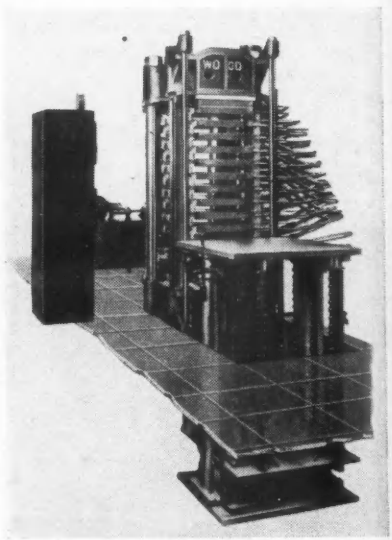
A lead generating device permits the grinding of cutters having helical teeth, and, since lead and rake angle of tooth are interrelated on form cutters. a unique mechanism is incorporated to provide compensation for rake angle. Leads are generated by tracing from a master lead cam mounted on the left-hand end of the workhead spindle. Six cams are supplied having leads of 30 in., 40 in., 50 in., 60 in., 80 in., and infinity. A second, angularly-adjustable flat cam is inter-connected with the lead cam by means of a pivoted rocker arm to provide compensation for rake angle. This interconnecting rocker cam is carried by a bracket extending from the wheelhead so that wheelhead movements cause rotation of the workhead spindle. Lead cams can be made for any desired lead other than standard, or a follower type toothrest mounted on the wheelhead can be used for cutters of unknown or intermediate lead.



Cincinnati contour cutter sharpening machine

E-2—Elevator for Platen Press

R. D. Wood Co., Philadelphia, Pa., has added to its line a precision type of platen press (285 tons) that is a complete sheet production unit. It includes the press with a loading and an unloading elevator, a two-pressure unit for



Wood hydraulic platen press with loading and unloading elevator

operation of press and elevator, an automatic valve control system with complete automatic adjustable control of press operating cycle, including pressure application and regulation of platen temperature, with all controls centralized in a panel board at the operator's station.

This press has been designed especially for laminating and polishing plastic sheets. Its design provides for positive pressure and temperature controls required for the repetitive production of exactly uniform sheets 0.003 in. to 0.0750 in. thick, in compliance to the most rigidly prepared specifications of thickness, uniformity, flexibility and coloring.

Heating platens are of the double-labyrinth type providing two separate thermostatically controlled steam and cooling water circuits for uniform heat-

New Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56.

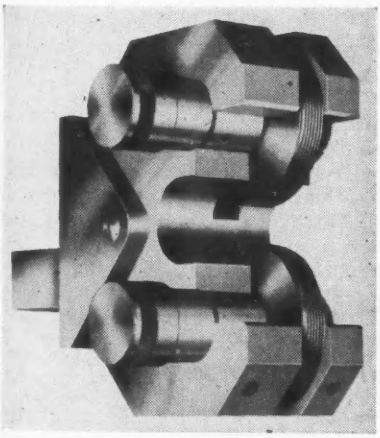
ing and cooling. The elevator has just twice the number of openings as the press—twenty openings. The sandwiches (alternate sheets and caul plates) are rolled into alternate openings of the elevator cage on needle-bearing rollers. The elevator, with the alternate sets of rollers filled, is raised to the point where the empty alternate sets of rollers line up with rollers in press openings, and then the cured sheets are rolled from the press into the elevator. Unprocessed sandwiches are then rolled into the press completing the unloading and loading operations with a minimum of press-idle time. While sheets are being processed the elevator is lowered and the finished sheets are unloaded and the elevator is reloaded.

Presses of this type can be built in a wide range of sizes for varying pressures.

E-3—Attachment for Rolling Threads

A new attachment for rolling straight threads is offered by the Landis Machine Co., Waynesboro, Pa. This Lanroll attachment is designed for application to practically all standard makes of automatic screw machines and turret lathes. The attachment provides for processing threads which otherwise would have to be handled as a secondary operation, as a result of shoulder interference or inaccessible positions for die head threading in the normal manner. Completing the work on the same chucking provides closer tolerance between the thread and other sections of the work piece. Generally the thread rolling operation can be performed at the same work speeds employed for other machining operations.

A thread rolling attachment is primarily a single purpose tool. For use

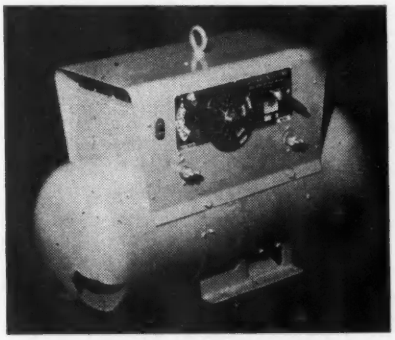


Lanroll thread-rolling attachment

on automatic screw machines the attachment must be designed for any one particular diameter, pitch, form and length of thread, as well as for the machine on which it is to be used. Application of the Lanroll attachment to standard automatic screw machines, having tool slides, is made by designing holders or shanks for the particular make, model and size of machine on which the attachment will be used. The attachment is engineered in accordance with tool slide movements, adjustments, etc.

E-4—Light-Weight Welding Machines

A new line of General Electric single-operator, high-speed, d-c arc welding machines, Type WD-40, has been designed for savings in size and weight, and improved welding characteristics. Operating at 3500 rpm, the new



Type WD-40 G-E welder

welders are available in 200-, 300-, and 400-amp models. Compact, weight-saving design makes them easily portable and saves floor space.

The arc is said to be easily established and maintained with the new welders because full arc voltage is generated instantly after short circuit, thereby avoiding unexpected pop-out of the arc. Excessive weld spatter is reduced because current peaks are adjusted for best performance on any setting.

A new single-dial, dual-range control used on the welder combines flexibility and precision of dual control, both broad and precise, with the convenience of single-dial control. This feature makes it possible for the operator to preset the correct current for any given job without having to make other adjustments after the arc is struck.

With this current presetting arrangement, a tap switch handle in the form of a pointer is set to the electrode size being used. It then automatically points out the proper one of several graduated scales on the face of the current-setting dial. This indicates the current range which should be used and permits precise adjustment of the welder output.

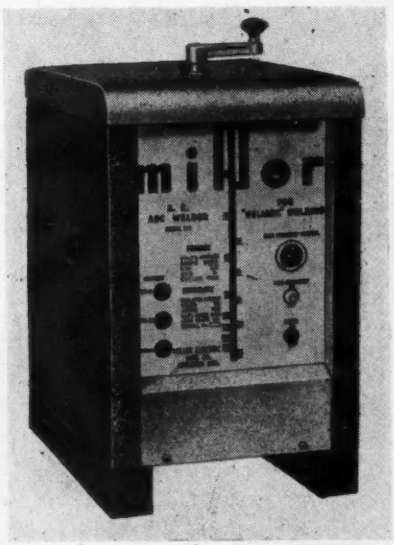
E-5—Attachment for Fork Lift Trucks

A new "scoop" attachment for its Motowlift fork lift truck was recently brought out by Service Caster & Truck Corp., Albion, Mich. The accessory, designed to speed the handling of bulk materials, features an air cushion shock absorber to prevent the scoop from slamming down on the mast.

All-steel welded, the scoop may be attached to the fork carriage in five minutes. Capacity of the scoop is 10 to 17 cu ft. It has a replaceable blade. The fork carriage of the Ford-powered Motowlift is designed for interchange from standard pallet forks to other types and special accessories such as the scoop.

E-6—Welders for Heliarc Welding

The Miller Electric Manufacturing Co. of Appleton, Wis., is introducing a new series of a-c welders especially designed for "Heliarc" welding. The "Heliarc" process requires an a-c welder of heavier construction than the metalic arc process. Miller a-c welders for "Heliarc" torches are engineered to meet these demands. These units in-



Miller welder

corporate adjustable high-frequency current and high-duty cycle ratings.

The high-frequency unit which is built into this welder is equipped with a variable control, enabling the opera-

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tor to change, or vary, the voltage of the high-frequency circuit for any application.

This process has made possible the welding of aluminum without flux. It also has many advantages in the welding of magnesium, stainless steel, high carbon steels, high alloys steels, brass, Everdur, Monel and copper.

E-7—Automatic Drilling Machine

A new special automatic drilling machine for truck rear-axle housings has been designed and built by Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit, Mich. The machine performs in a single automatic cycle a number of drilling operations.

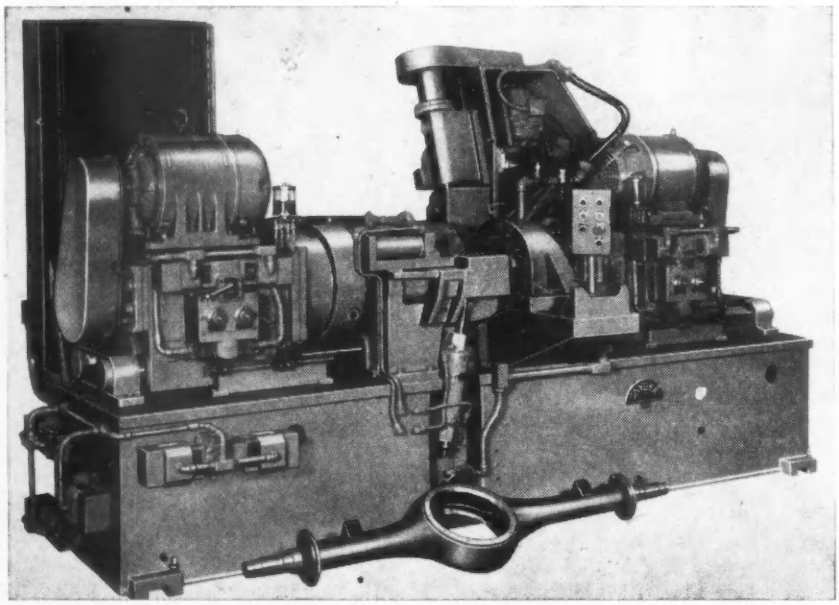
The entire work-cycle, including clamping, drilling 21 holes and releasing, requires 15 seconds. Operating in an automatic sequence, a movable bushing plate and two individually-actuated hydraulic clamps, locate and clamp the work-piece in the fixture. The hydraulic clamps are mechanically locked to hold the parts securely in place while machining.

The parts are engaged on the two banjo faces by two opposed pilot diameters which enter the banjo face bores. One pilot diameter is stationary, while the second pilot diameter is movable and is wedge-locked in place by a separate cylinder after entering the bore.

Two Snyder self-contained hydraulic units, each carrying a ten-spindle head, are mounted opposed to each other and are used to drill the 20 holes of the banjo faces.

A single spindle unit mounted on an inclined angle, and behind one of the Snyder self-contained units, is used to drill the breather hole. This unit is also hydraulically actuated to and from the working position to permit loading and unloading of the parts.

High speed steel drills are employed, operating at 60 sfm, feed 0.008 in. per revolution. Hydraulic feed for all tools includes rapid advance to working position, working feed, and rapid return.



Snyder special automatic drilling machine for truck rear axle housings

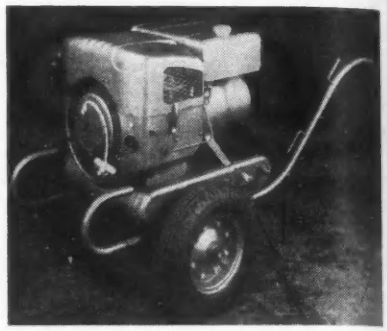
E-8—Lightweight Portable Welder

A new portable gas-driven d-c arc welder is being produced by the Hollup Corp., a division of National Cylinder Gas Co., Chicago, Ill. Because of its light weight—315 lb—and compact construction, the "Sureweld" is portable on the job as well as to the job. The welder is 32 in. long, 26 in. wide, and stands 28 in. high without wheels. It fits easily into the back of a "Jeep," station wagon, or even the trunk compartment of some cars.

Light weight is achieved through use of an aluminum housing and aluminum alloys in engine parts wherever practical. The generator and engine are directly connected, forming a single compact unit.

The generator is a four-pole, self-excited type with interpoles. The welder is rated at 150 amp at 30 volts on 50 per cent duty cycle. It has a four-cyle, two-cylinder, opposed design engine.

Electrodes up to and including 5/32 in. and certain types of 3/16 in. may



"Sureweld" portable welder

be used with the welder. Two receptacles for extension cords on the machine provide for emergency lighting. Two models are available. One is mounted on a two-wheel dolly with pneumatic tires; the other is a stationary type with a guard frame.

E-9—Production Honing Machine

As an expansion of work size capacity of its line of honing machines, and to simplify operation and maintenance of its high production type Microhoning machines, Micromatic Hone Corp., Detroit, Mich., now offers a unit-constructed, single spindle, heavy duty honing machine with quill type spindle for honing bores from 1 in. to 4 in. diameter up to 9½ in. long.

These machines are made up with the following three units assembled on the column and base of any other Micromatic Microhoning machine: The spindle, hydraulic control panel, stroke control mechanism, and speed control transmission which are all in one integral assembly; the hydraulic unit which comprises the hydraulic pump, tank, and pressure control valves; and the electric control panel.

To permit faster stroking without increased power input, all weight that must be reciprocated to stroke the tool has been minimized. All head and guide bars have been eliminated—the spindle is the piston rod with rings that act as the piston. Stroke control is more positive and accurate because it is direct, without linkages or levers. Accuracy of spindle alignment with the work is said to be assured, because torque and thrust are taken by the

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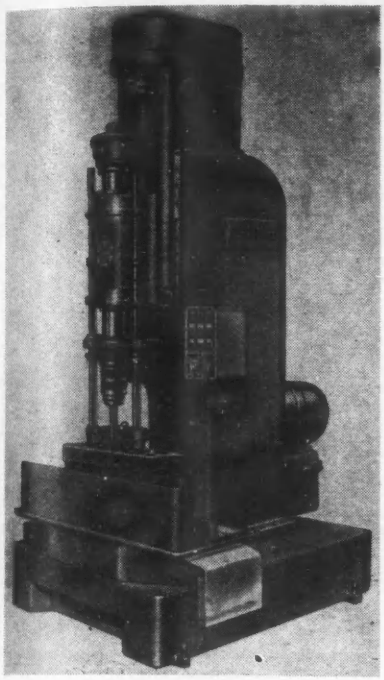


Quill type Microhoning machine with lateral indexing fixture, and with automatic Microsizing control, for Michrohoning automotive cylinder block bores

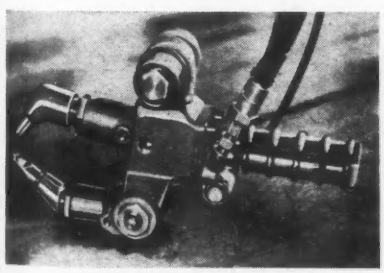
quill closely above the tool.

This design and construction also reduces the amount of hydraulic piping and fittings, thus reducing the possibility of leaks.

E-10—Welding Gun And Booster

A new design has been introduced in a double acting, hydraulically operated welding gun and booster by the Dalhart Engineering & Manufacturing Co., 14287 E. Jefferson, Detroit 15, Mich. The gun and booster are to be identified by the trade name "Dalhart."

Among the advantages claimed for this completely hydraulically operated



Dalhart welding gun

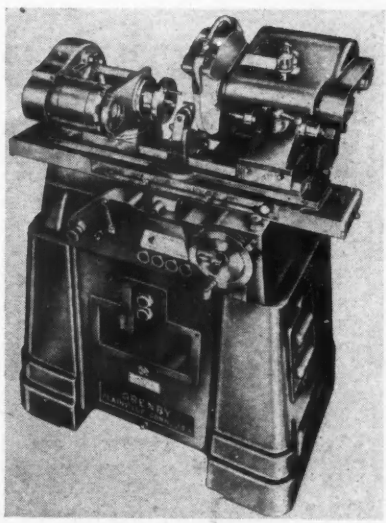
welding gun and booster are; strong uniform welds because point pressure, hydraulically actuated, is uniform regardless of wear on points, and uniform hydraulic pressure that eliminates destructive burning and pitting at point of weld by reducing arcing to a minimum.

Mechanical speed of "Dalhart" gun is limited only by the maximum speed with which a solenoid air valve can be operated. Small cylinders and high fluid pressures combine to make a custom built welding gun of light weight and compact design that can be adapted to a wide variety of applications.

Welding point pressure can be varied by controlling air pressure on booster inlet and a variety of metal thicknesses can therefore be welded with one gun. The diameter of both air and hydraulic pistons of the booster can be varied to suit any welding condition.

E-11—Two New Hydraulic Grinders

The Grenby Manufacturing .Co., Plainville, Conn., is producing two new hydraulic grinders—a universal external grinder EG-103 and a universal internal grinder IG-103. Either machine can be equipped with two heads to make a combination external-internal grinder.



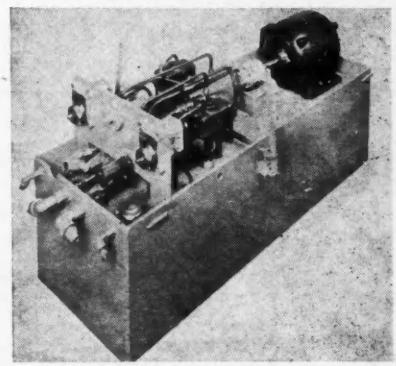
Grenby external grinder Model EG-103

The capacities recommended by the manufacturer are: external, three inch diameter by 10 in. long between centers; internal, three inch diameter by four inch long. Both can actually grind work to the full swing over the table of nine inch diameter.

These grinders are primarily tool room equipment but due to the accuracy of the stops for maintaining size, lever collet closer, hydraulically operated table, semi-sizing diamond dresser, coolant, and other features may be used for production work. They differ from the older hydraulic models in that the table is operated entirely hydraulically, even when manually controlled.

E-12—Hydraulic Power Unit

Built for activating any hydraulically driven machinery, a new hydraulic power unit is the latest product of Hufford Machine Works, Redondo Beach,



Hufford hydraulic power unit

Calif. The unit is completely self-contained with motor, pump, valves and flow controls mounted above the hydraulic fluid reservoir and filter system. A cover encloses the unit, preventing entrance of dust and foreign matter. Built-in selector valves enable both forward and reverse motion of the machine to which the power unit is applied, and the meter flow controls permit speed of the driven mechanism to be varied over a wide range. The unit, as illustrated, is suitable for both manual and automatic operations.

E-13—Spot and Projection Welders

A complete new line of improved roller-head, press-type spot and projection welders, ranging from 50 to 500 kva capacity has been announced by Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.

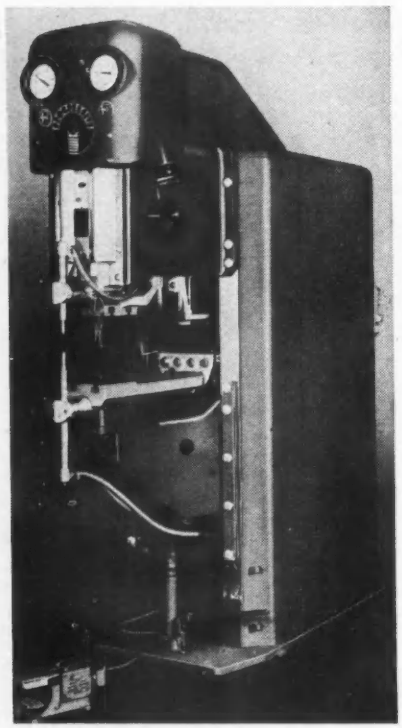
These new welding machines are said to be equally adapted to continuous high production runs and to handling of various types and sizes of work on a job-lot run basis. This combination

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56.

has been achieved by designing the machines for high speed operation while providing for rapid change-over in the arrangement of knees, welding arms, platens, electrode holders, etc.

Provision can be made for pulsation welding, resistance-upsetting and resistance-brazing; also for pre-heating, post-heating or tempering of the work while still in the machine.



Progressive roller-head, press type spot and projection welder

In these machines, the frames are designed in two sections. The forward section of the frame, which has to take all the high stresses incident to resistance welding with high pressures, is of massive construction, heavily reinforced and braced. To this section are attached the head, knee, platens and arms. Welding transformers are also supported from this frame section.

The rear section of the frame, in contrast, is of relatively light-weight construction, and is actually a removable sheet metal enclosure. As a result, the interior of the machine is completely accessible for any work to be done on controls, electrical connections, etc.

Machine operation is obtained through either air or hydraulic actuation, on all sizes up to 250 kva. On larger machines, hydraulic operation is standard. All machine sizes are available with throat depths of 18, 24 or 30 in. (projection welding)—18-36 in. for spot welding.

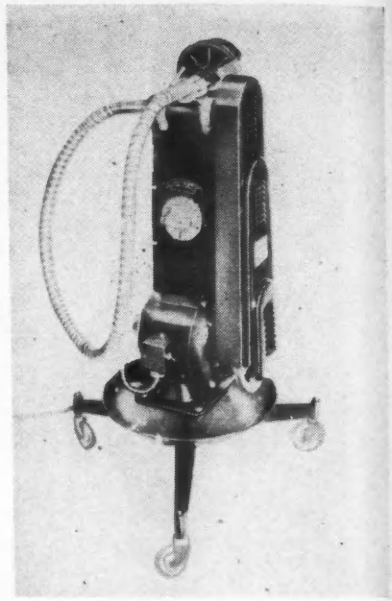
E-14—"Air-Tracer" For Lathes

The "Air-Tracer" is a device recently developed by The Monarch Machine Tool Co. Sidney Ohio, for application to the company's regular toolmaker and engine lathes. Hydraulically-operated, the mechanism guides the motion of the standard lathe cutting tool in strict conformity with a master template of the finished piece.

Typical of what can be done with the new device is the recent reduction in total machining time achieved on winch shafts for oil well equipment. This job calls for turning ten different diameters and two tapers on a 23-in. long stress proof steel shaft. Without the new lathe attachment, the operation took 45 minutes per shaft. With the new device, the same 16-in., Model C Monarch engine lathe, using the same tooling and operating on the same material, finished the work in three minutes.

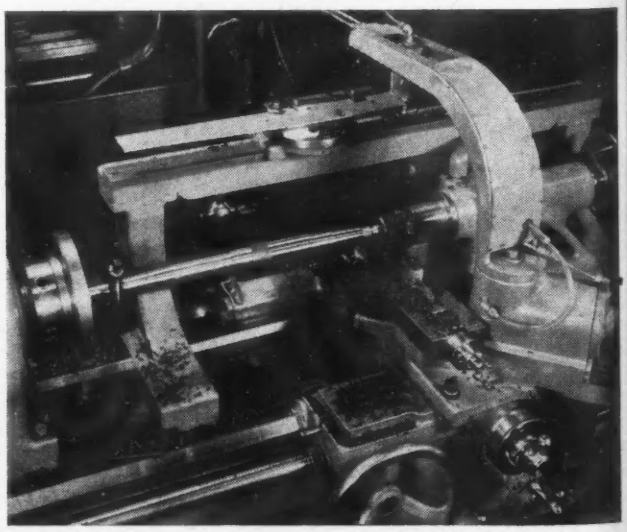
E-15—Flexible Shaft Machine

A completely new variable speed flexible shaft machine is announced by Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill. Known as the "Wycomatic" Speed Changer, this new model frees the operator from the restrictions of fixed speed machines and gives him complete speed control of a shaft which can be instantly adjusted to any desired speed. By means of an adjustable dial control (not a rheostat) the "Wycomatic" permits gradual change from slowest to fastest speed.



Wycomatic Speed changer

Other features claimed for the new "Wycomatic" Speed Changer include the safety cabinet which swivels on ball-bearing motor base and encloses the speed change mechanism and belt guard, low center of gravity which prevents tipping over, specially designed eccentric lock which can be used to hold handpiece so securely that machine can be used as stationary grinder, and an eccentric adjustment on jackshaft for belt tightening. In addition the "Wycomatic" is described as equipped with WYCO precision shaft, precision handpiece, wheel arbor, 6-in. grinding wheel, and wheelguard with outboard handle.



Monarch "Air-Tracer"

New PRODUCTS

For additional information regarding any of these items, please use coupon on page 56.

F-1—Improved Piston Rings

Chambersburg Engineering Co., Chambersburg, Pa., has developed the Cecó ring, a piston ring with wearing qualities that are said to extend its useful life threefold or better. Tension, hence sealing properties, is maintained throughout life of ring. The ring is heated by induction and automatically quenched and tempered.

Heat treatment is accomplished by mechanically feeding the ring through an electronic heater work coil which has been immersed in oil. Power output of the generator and speed of the feeding device are so regulated that the section of the ring passing through the coil is heated to 1600 F and immediately quenched as it passes from the coil into the oil. Temperature of the oil quench is held below the flash point by continuous circulation of the liquid. The ring is tempered in the same continuous mechanism, the feeding device being raised above the level of the oil quench and speed and generator output adjusted so that the ring is reheated to 950 F and cooled in still air.

Ceco Rings have been adopted as standard on all Chambersburg hammers and have been placed on the market for general sale.

F-2—New Type A-C Motors

With the completion of new production facilities in Freeport, Ill., Fairbanks, Morse & Co. has introduced its line of "Axial Air-Gap" a-c motors. They range in size from 1/3 to 10 hp and are suitable for horizontal or vertical flange mounting or on an angle base for belt drive.

Fairbanks, Morse Type QZAU axial air-gap motor

Principle of operation is distinguished by the fact that magnetic lines of force follow a path parallel to the shaft rather than the radial path as in conventional motors. Outstanding features are space and weight reduction, the new motor being less than half the length of the conventional NEMA type motor and weighing about 30 per cent less. However, it delivers the same output and has the same characteristics as the conventional motor. The axial-gap motor is slightly larger in diameter than the conventional type.

In addition to its compactness, the new motor has the following advantages: simplicity and speed with which it can be inspected, cleaned, and lubricated; a cooler rotor, hence cooler running; it provides important space saving on machine tools when used as a flange-mounted motor, with less overhang. It is recommended by the manufacturer for applications where space saving is important, particularly for vertical applications. It is not intended to displace or supersede the conventional type motor in general industrial applications, except in those cases where compactness and lightness are definite advantages.

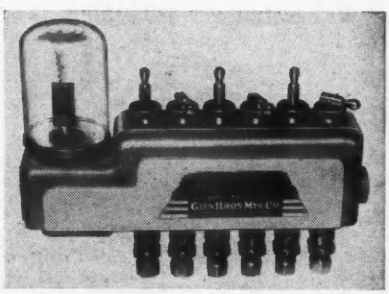
The flywheel effect of the axial-gap motor is about three times that of conventional motors and this becomes of real importance for special applications such as punch presses, oil well pumping units, etc., where the added flywheel effect reduces the size of the flywheel usually required and contributes to smoothness of operation.

Special techniques have been developed for producing the rotor and stator elements of this motor, together with an inside-frame construction in which the supporting member of the stator also supports the anti-friction bearings. The rotor is of unusual design and features the Fairbanks-Morse principle of centrifugally-cast copper-spun construction.

The motors are available in single-phase, two-phase, and three-phase types with suitable accessories for line starting.

F-3—Multiple Oiler

A new multiple oiler has been designed for central point oiling of remote bearings by the Gits Bros. Mfg. Co., 1846 S. Kilbourn Ave., Chicago, Ill. It is a centralized unit made up of a transparent reservoir of unbreakable plastic with a non-spill valve which simplifies refilling, and a main reservoir from which copper tubes lead to the various remote oiling points. In the main reservoir, fed from the plastic constant-level reservoir, the oil is maintained at an even level, insuring a well-regulated abundance of oil to the individual bearing. By the same principle overflow and flooding of bearings is said to be impossible.

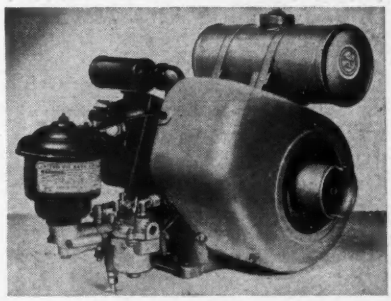


Gits Style GM multiple oiler

A unique feature is the inclusion of a series of valves—one for each of the leads—permitting the flow to each bearing to be adjusted individually or turned completely on or off. Thus the system may serve more than one machine, or it may serve complex units with independently working parts.

F-4—Continental Air-Cooled Engine

Continental Motors Corp., Muskegon, Mich., has started production of a new 1½ hp single-cylinder, air-cooled engine for the market represented by walking-type tractors, power lawnmowers, scooters, pumps, small construction equipment, compressors and other general utility equipment.



Continental AA7 engine

Entry into this market marks Continental's first departure from the liquid-cooled engine field, except in its aircraft engine division, although its Wisconsin Motor Corp. subsidiary is a manufacturer of heavy-duty, air-cooled engines for industrial and agricultural uses.

The new engine, known as the AA7 model, is a 4-cycle, L-head unit, cooled by a blower-type flywheel shrouded to force air over the large cooling fins on the cylinder and head. It is rated at 1½ shaft hp at 2400 rpm. Bore is 2⅛ in., stroke is 2 in and piston displacement is 7 1/10 cu in.

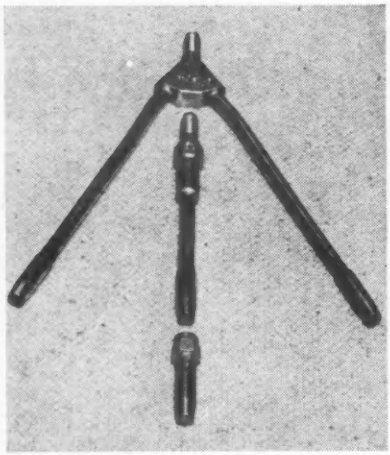
NEW Products

For additional information regarding any of these items, please use coupon on page 56.

F-5—Multiflame Brazing Tips

The Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., has added three new multiflame brazing tips to its apparatus line. These tips are recommended by the manufacturer for use in silver brazing, high-temperature brazing and in the application of hard-facing alloys.

Style 721 is a light, compact, multi-



Airco multiflame brazing tips. Top, style No. 722; center style No. 721. bottom, style No. 723

flame tip brazed to the end of a short, completely flexible copper extension. It is available in sizes 5, 6, 8 and 10.

Style 722 is a dual tube tip brazed to a flexible copper extension. It comes in sizes 5 and 7.

The Style 723 multiflame brazing tip was developed especially for brazing operations where it is advisable for the operator to be farther away from his work. The tip itself is identical with the tip end of Styles 721 and 722 but should be used with a standard 10 in. flexible extension tube.

All of these tips are said to operate satisfactorily with various gas combinations — oxyacetylene, oxyhydrogen, oxy-city or natural gas. The latter two types of gases must be under pressure when used for brazing.

F-6—Welding Rod for Die Castings

All-State Welding Alloys Co., Inc., 96 W. Post Rd., White Plains, N. Y., is making a low-temperature welding rod for use on zinc-base die castings in 3/32-in. diameter, round form. The maker states that this small diameter has been found ideal for most applications and is extremely easy to apply. The rod, known as All-State No. 53 zinc base die cast rod, has a working temperature of only 400 F; it has a high shear strength of 25,000 psi, and it is said to give a perfect color match. It can be used with or without a flux.

F-7—Kit of Mounted Points

A handy kit of mounted points is announced by Norton Co., Worcester, Mass. It is designated as the Norton No. 16 Mounted Point Assortment and is made up of one each of the 16 most popular sizes and shapes. They are packaged in a box which serves as a shipping container and also as a handy holder on the bench while the points are in use. Each point has its own individual location in the box, stamped with the number of the point so as to facilitate reordering of any particular shape.

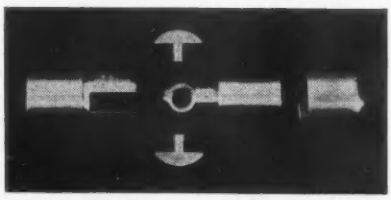
The points are made of 38 Alundum abrasive vitrified bonded and strongly cemented on steel spindles.

The kit is said to be particularly useful for tool and die makers who need a variety of shapes and sizes.

F-8—Universal Joint

The B. M. Root Co., York, Pa., has just placed on the market a universal joint of novel design. The joint works with a "ball-and-socket" action similar to a toggle joint.

The stress of transmitting power



Exploded view of Root universal joint

through the angular range of joint deflection is absorbed by two oversize keys. This provides a margin of strength at the point where failure of universal joints is most likely to occur.

The socket of the joint provides a natural oil reservoir for retaining oil and the consequent lubrication of bearing surfaces by capillary action.

All parts are machined to close tolerances and wearing surfaces are hardened.

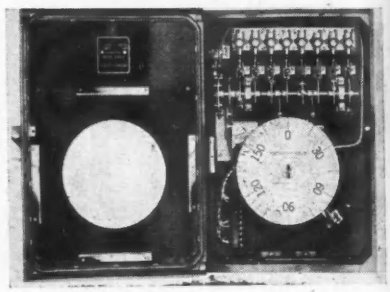
The joint has only five parts. A spun cap with rolled edge holds the structural parts in place.

The joint has a relatively small outside diameter in relation to the size of the shaft it will turn. This makes the joint useful where restricted space is available for placement of the joint.

The joint is available for shafts from ¼ in. diameter to ⅞ in. diameter. Larger size joints can be furnished on application.

F-9—Time Cycle Controller

The Bristol Co., Waterbury 91, Conn., has developed a new multiple-cam time cycle controller, known as the Model C500 impulse-sequence cycle controller, for timing mechanical operations in industrial processes. This instrument is



Bristol multiple-cam time cycle controller

designed for use on plant processes where a number of factors, such as the opening and closing of valves, switches, dampers, retorts, and presses, and the starting, stopping, or reversing of motor-driven pumps, and blowers, must be accurately timed according to a fixed program. In operation, the Model C500 impulse-sequence cycle controller actuates or engages, at the correct time in each cycle, the necessary mechanical, electrical, or pneumatic devices for automatically carrying out the intended schedule.

In this controller, time measurement and pilot valve operation are handled by separate mechanisms. Separation of these two basic functions made possible a design that gives accurate timing of the factors under control, high speed and torque for pilot valve operation, and flexibility of application.

Timing is accomplished by a Telechron-driven aluminum disc on which is printed a 25-in. time scale. The desired schedule of operations is incorporated into the controller by cutting notches with a notching punch on the time scale. The location of these notches determines the time of operation of the cam mechanism. Discs for new cycles or schedules of operation can be easily made. Time impulses are transmitted electrically.

COLD HEADED "SPECIALS"

for Special Fastening Jobs

HERE are a few of the many "special" headed and threaded fasteners produced by "National" to solve special fastening problems. Made by the cold headed, upset process, these parts are stronger and more economical than when produced by other methods. "National's" engineers have designed special fasteners for a wide range of industry. The group above represents parts for automotive vehicles, refrigeration, tool manufacturers, metal furniture, lighting fixtures—even prefabricated houses.

If you need a special fastener to fit the products you are making, write us. Our engineering and manufacturing departments may be able to design and make it for you, and save you money.

National
PRODUCTS

THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

Expansion in Tractor Industry

(*Continued from page* 30)

previewed recently at Dearborn Motors "experimental educational farm" at Clarkston, Mich. The company also unveiled its line of farm equipment, designed to operate with the Ford tractor. Implements are manufactured by independent manufacturers.

Ford is all set up for production of the new tractor at the Highland Park plant to which tractor production was transferred from the Rouge plant two years ago. It now has about 420,000 sq ft of space devoted to tractor production and has announced a schedule of 400 tractors a day. This figure was attained in March and actually has been exceeded on several occasions with a high of 432 for a single day. No immediate expansion of facilities is contemplated, but will be determined by market conditions in the future.

In equipping the Highland Park plant, the company spent approximately $5 million. New equipment includes 200 new machines. A modern materials handling system which provides for single unit handling of materials by forked trucks now is in use throughout the plant. Practically all incoming supplies are handled on pallets.

Plans of Harry Ferguson, Inc., are in doubt at the moment. Following the original announcement of the divorce from Ford, Ferguson purchased a war plant at Cleveland at a cost approximating $2 million and announced that it would continue to build and distribute tractors. At that time, it planned an additional expenditure of $1.35 million to set up an assembly line with an additional $1.75 million contemplated for plants which would supply parts and unit assemblies. However, a proposed $8 million stock issue which had been planned to finance the operation was abandoned because of unfavorable market conditions. All work on the plant was suspended and since that time there have been no signs of further activity. It is not known definitely whether the Ferguson organization will resume its manufacturing plans at a later date, whether it will stay in business as a service and implement sales organization, or whether it will take some other course. Ferguson now is producing a tractor in England and it is understood that the tractor the company had under consideration for manufacture here would be the same model as is being built in England.

International Harvester

International Harvester, the industry's leading producer, is planning a 50 per cent increase in its tractor manufacturing capacity. Its principal expansion centers in Louisville, where a war surplus plant was purchased from the Government early in 1945 at a cost of $6.7 million. Its original 1,063,000 sq ft of floor space has been enlarged by 700,000 sq ft, which with equipment, etc., is adding $10 million to the cost. This work is now nearing completion, permitting limited production of the new Farmall Cub which was given its first public showing in June. Full production of the Cub is expected to be reached some time in 1948 at an annual rate of 50,000.

Contract for a new gray iron foundry at Louisville was awarded last March, and with this addition completed sometime in 1948, the company expects to have full scale production under way by Jan. 1, 1949. When this is accomplished some production will be shifted to Louisville from Chicago. Other current expediting of production involves the transfer of some production from its Milwaukee plant to a new plant at Melrose Park, near Chicago, which was acquired some months ago. Also, after innumerable delays from various causes over a two-year period, the new cotton picker plant in Memphis is nearing completion and some production of the cotton pickers which are tractor-minded units is now under way. Several million dollars of the original appropriation for this plant are being expended this year.

Five Massey-Harris Models

The Massey-Harris Co. which has greatly strengthened its position in the industry during the last three or four years, has virtually completed its postwar expansion program but is continuing its expenditures for new tooling and has just recently completed the installation of extensive new heat treating facilities at its new Racine plant.

The company acquired the former Nash plant in Racine in 1942 when it was awarded a contract for military tanks and during the winter of 1945-46 all of its manufacturing operations in Racine were transferred from its former 70-year old factory. The new plant covers 30 acres with 845,000 sq ft of buildings under roof. The new plant has increased its production facilities, particularly with respect to tractors, 100 per cent as compared with prewar. The company is now building five new models of tractors and was one of the first companies in the industry to announce a complete postwar line.

Extensive modernization and reequipment of the Batavia, N. Y., plant also has doubled its capacity, and its output will provide a commensurate increase in power equipment to be operated by its tractors. Expenditures are expected to continue at the rate of $500,000 to $1 million annually for some time as the modernization and expansion continues.

Minneapolis-Moline Improvements

Minneapolis-Moline was able to synchronize its expansion and modernization program with its military production operations during the war. New equipment acquired during the period, in order to handle war goods contracts, was generally adaptable to tractor and farm equipment production, with the result that the company's 1946 production was practically double that of prewar years. However, the improvement of production facilities is continuing, especially in its foundries and machine shops. In the foundries additional sand-handling equipment is being installed, all molding operations are being mechanized and rearrangement and expansion of casting, grinding and cleaning operations are under way. Other improvements include mechanical equipment for core drying, core sand handling and storage.

Considerable replacement of machine shop equipment is under way, the general program being one of rearrangement to reduce handling costs, the elimination of older units and substitution of labor-saving equipment wherever possible. Machining operations for engine building have been relocated and a new assembly department has been set up. Material handling throughout the plant will be by the palletized system. Work now under way will call for an expenditure of between $1.8 and $1.9 million.

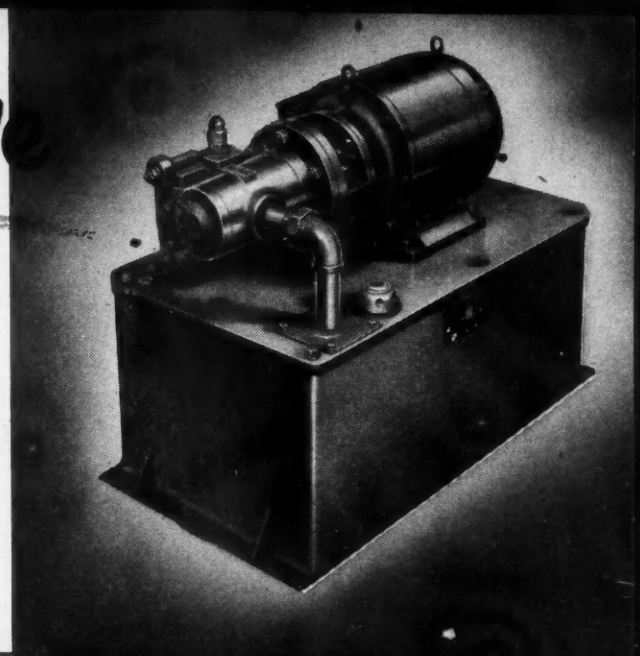
Oliver Five-year Program

The present period finds Oliver in the midst of a five-year program of plant modernization and rehabilitation which started Nov. 1, 1944, a program in which $10 million already has been expended and will require equal or greater outlays for its completion. Five principal objectives of the multi-million dollar project are: (1) to bring up to standard all machinery which had been run down or become obsolete during the depression, post-depression and war years; (2) to purchase machinery which will reduce manufacturing costs; (3) to expand where desirable and eliminate present bottlenecks; (4) to accomplish normal replacement of tools, dies, jigs, fixtures and patterns, and (5) to handle the cost of new product tooling.

The first new construction on the program is starting with an addition to its wheel tractor plant in Charles City, which will provide 100,000 sq ft of new floor space and according to President Alva W. Phelps will make possible a 25 per cent increase in production, and provide capacity for an annual output of 25,000 tractors.

(*Turn to page* 62, *please*)

Simplify and Save on Hydraulic Systems with VICKERS POWER UNITS



The "hydraulics" on this Ingersoll 24-Station Process Machine transfers the transmission castings from station to station and provides power for clamping, locating and chip disposal. The hydraulic system design was simplified and cost reduced by using the twelve standard Vickers Self-Contained Hydraulic Power Units shown.

These units provide a compact hydraulic power package which can be applied to almost any system. They are available with various pump combinations to meet a wide range of requirements up to pressure demands of 2,000 psi. There are 92 standard sizes and types of single stage, two stage and dual pressure pumps equipped with motors from ¾ to 20 hp.

The oil reservoir serves as a base to save floor space. On it is mounted a standard Vickers Motorpump or a Vickers pump with separate motor drive. A Vickers "balanced piston type" pressure relief valve provides accurate control of hydraulic pressure. A simple wrench adjustment sets maximum operating pressure at any desired figure within recommended pressure range. Filters and reservoir are readily accessible for cleaning. See Bulletin 46-43 for the many other features.

Vickers Hydraulic Power Units are frequently the most desirable source of hydraulic power. Vickers application engineers will be glad to discuss your hydraulic power and control problems.

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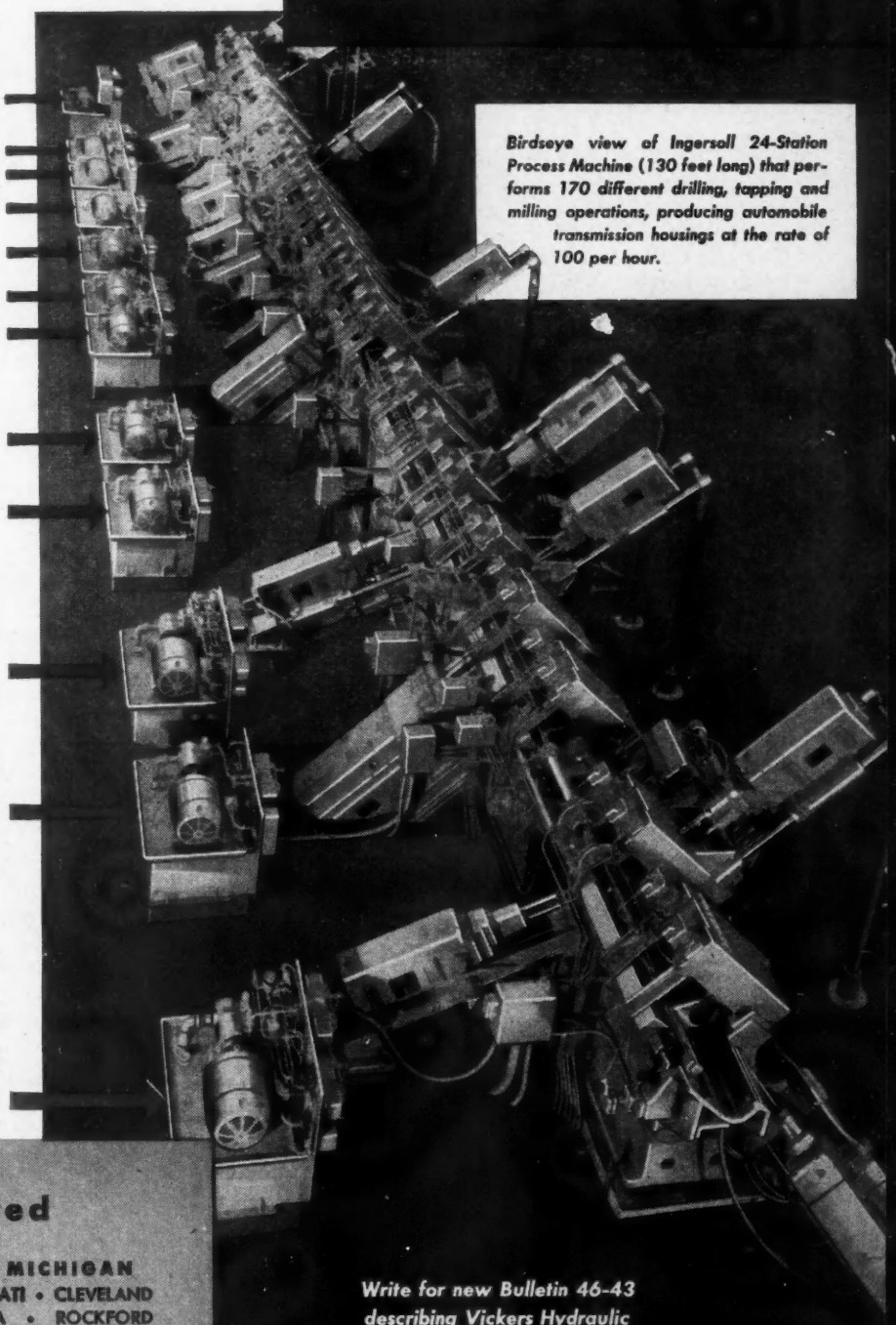

Birdseye view of Ingersoll 24-Station Process Machine (130 feet long) that performs 170 different drilling, tapping and milling operations, producing automobile transmission housings at the rate of 100 per hour.

Write for new Bulletin 46-43 describing Vickers Hydraulic Power Units

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

D-1—Pedestal Spot Welders

Progressive Welder Co.—A 2-color technical Bulletin, No. 503, describing its new line of Economy type standard pedestal spot welders. The bulletin gives an idea of the numerous types of applications to which these welders are adaptable. Different types of interchangeable electrode holders and electrodes available are shown. It also contains complete specifications, drawings and details as well as general photographs of the welders.

D-2—Steam Cleaning Unit

Oakite Products, Inc.—A special 12-page illustrated booklet describing the new, improved Oakite-Vapor Steam Cleaning Unit. Data on Unit construction, engineering specifications, types of models available and job applications of this latest model steam generator for multiple-duty industrial steam-cleaning and paint-stripping operations, are factually presented in concise form. For greater clarity the text has been augmented by a series of clear-cut illustrations of operating, control and mechanical features; types of models available to meet varying job requirements and views of the Unit in actual steam-cleaning operations of various kinds.

D-3—Gasket and Sealing Materials

Armstrong Cork Co.—20-page booklet which contains suggestions for the selection and use of resilient sealing materials, a chart of gasket recommendations for sealing various liquids and gases, and a number of diagrams showing physical properties of different gasketing compounds. Also included is a description of Armstrong's gasketing materials with charts of their physical properties.

D-4—Resistance Welders

Weldex, Inc.—10-page catalog describing their complete line of bench and floor models. Three pages of illustrations of typical applications, including several examples of projection and spot welding are included.

D-5—Contour Cutter Sharpening Machine

Cincinnati Milling Machine Co.—Publication No. M-1552 describes and illustrates the company's Contour Cutter Sharpening Machine. Highlights of Design, including a detailed description; illustrations of the machine; advantages derived from use of the machine; operating controls and construction details; general specifications and a dimensional drawing; standard equipment supplied with the machine and additional equipment which is available, are given.

D-6—Precision Equipment

Robbins Engineering Co.—New catalog, Precision Equipment for Angular Set-Ups, describes the Magna-Sine, the Univ-Angle, The Sine Plate and the Robbins Sine Bar. Complete details are given on each of these products as well as dimensions and application suggestions.

D-7—Textolite Laminated Plastics

General Electric Co., Plastics Div.—A new 64-page booklet containing complete information on the manufacture, application engineering and properties of all types of Textolite laminated applications. It lists 44 different grades of the sheet material along with their electrical, physical and mechanical properties. Other information given contains necessary information on Textolite tubes and rods, bearing materials, silent gears, decorative surfaces,

(*Turn to page* 58, *please*)

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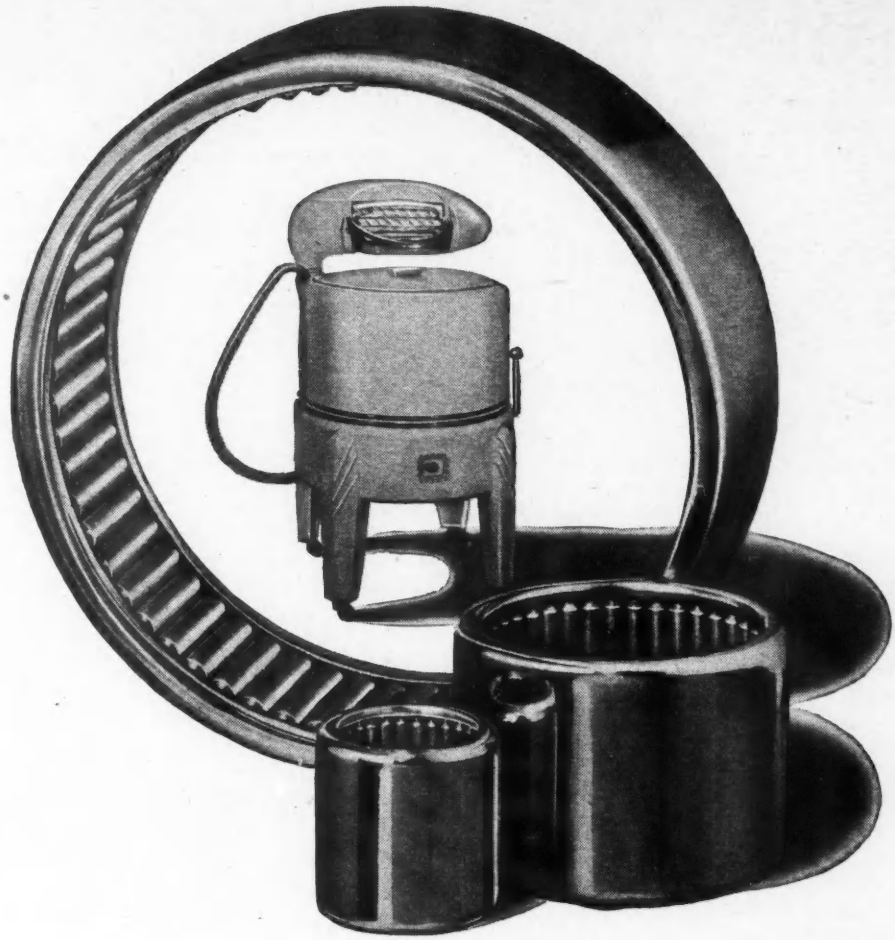

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PERSONALS

Recent Personnel Changes and Appointments at the Plants of Automotive and Aviation Manufacturers and Their Suppliers.

Carpenter Steel Co.—**O. V. Greene** has been made Assistant General Sales Manager, **H. S. Potter,** Manager of Tool Sales, **W. M. Loos,** Manager of Stainless Steel Sales, **J. W. Thompson,** Manager of Alloy Steel Sales. Other promotions are **J. D. Nelson,** Asst. Manager of Tool Steel Sales, **M. H. Goodman,** Asst. Manager of Stainless Steel Sales. **E. Von Hambach,** Research and Development Engineer, formerly located in Detroit, has established headquarters in Reading, Pa.

Atlas Powder Co.—**E. H. Bucy** appointed General Manager of Cellulose Products Dept.

The Electric-Auto-Lite Co.—**W. A. O'Brien,** appointed Manager of Foundries.

Westinghouse Electric Corp.—**E. H. Vedder** has been appointed Manager of the newly formed Electronic Control Engineering section and **R. W. Staggs** has been named Manager of the Electronic Control Sales section. Both men have headquarters in Buffalo, N. Y.

Ford Motor Co.—**Richard E. Roberts,** Director of newly created Management Relations Dept. **John Oswald,** Executive Engineer of Styling and Body Engineering, a new engineering post.

Willys-Overland Motors—**Howard O. Lund,** named Sales Manager.

Allis-Chalmers Mfg. Co.—**William A. Roberts** and **William C. Johnston,** appointed Executive Vice-Presidents, respectively, of the Tractor and General Machinery Divs.

General Motors Corp., New Departure Div.—**Harry P. Henderson,** General Supervisor of Methods and Plant Layout.

Boeing Airplane Co.—**O. W. Tupper,** retired as assistant to the president, and **Norman Allen** appointed to the vacancy.

Lockheed Aircraft Corp.—**John E. Canaday,** Director of Public Relations, has been elected Chairman of the National Public Relations Advisory Committee of the Aircraft Industries Association.

Goodyear Tire & Rubber Co.—**H. D. Foster,** Manager, Mechanical Goods Div. **Sam DuPree,** made Asst. Manager.

Atlantic Tubing & Rubber Co.—**Norman L. Flewwellin,** Director of Sales.

Barrett Equipment Co.—**Ross Chastain,** General Sales Manager; **Earl R. McAtee,** Director of Barrett Brake School; **Cliff Garstang,** Sales Manager, Eastern Div. and **Milford N. Cain,** Sales Manager, Western Div.

Aluminum Company of America—The retirement of **George J. Stanley,** a Director, Vice-President and General Sales Manager of the company, is announced as of July 1. He will continue as a Director. **Ralph V. Davies** has been made General Sales Manager for Alcoa, succeeding Mr. Stanley. **Robert B. McKee** and **Donovan Wilmot** have been promoted to Vice-Presidents of the company.

Dana Corp., Spicer Mfg. Div.—**A. G. Leber** has been appointed to the Sales Engineering Staff.

Norma-Hoffman Bearings Corp.—**F. W. Mesinger,** Vice-President, has been elected to the Board of Directors. He is in charge of sales.

The International Nickel Co., Inc.—**Hugh J. Fraser,** Vice-President, has been placed in General Charge of all Plant Operations of the company in the United States. **John A. Marsh** (Huntington, W. Va. Plant), has been made Mr. Fraser's assistant. **Joseph M. Weldon,** appointed Asssitant to Vice-President **H. J. French.**

Mullins Mfg. Corp.—**Frank M. Beauregard,** elected a Vice-President.

Cummins Diesel Export Corp.—**George W. Glenn,** made Manager.

Toledo Steel Products Co.—**William Deeg,** appointed Supervisor of Customer Relations.

The Aro Equipment Corp.—**J. C. Hurley,** Manager in charge of Original Equipment Sales.

Clearing Machine Corp.—**W. Fosh Dew** appointed Sales Manager.

Menasco Mfg. Co.—**John C. Lee,** resigned as President, but remains a member of the Board of Directors.

Dearborn Motors Corp.—**Lawrence H. Pomeroy,** has become a member of the Executive Staff.

E. W. Bliss Co.—**Harry T. Burke,** appointed Asst. to General Sales Mgr.

Bohn Aluminum & Brass Corp.—**Randolph J. Roshirt,** appointed General Manufacturing Manager.

Koppers Co., Inc.—**John A. Worthington** has been made General Sales Manager of the Piston Ring Div. **T. Latimer Ford** will head up a new company department devoted exclusively to replacement sales.

Publications Available

(*Continued from page* 56)

translucent sheets, nameplates, molded-laminated plastics, low-pressure laminated plastics, methods and fabricating laminates and ordering instructions.

D-8—Allcast Aluminum Alloy

The National Smelting Co.—A revised edition of the bulletin on Allcast Aluminum Alloy has been issued. In addition to the history, features and recommended applications of Allcast, the revised bulletin gives latest data on its mechanical and physical properties. Test results from production heats are given.

D-9—Samson Cold Cleaner

Cee-Bee Chemical Co., Inc.—4-page folder describing and illustrating Cee-Bee Samson Cold Cleaner. It discusses decarbonizing, degreasing and bright-cleaning of blocks, pistons, crankcase assemblies, carburetors and other parts; describes open tank immersion as well as cleaning in the Samson Junior and Midget parts cleaning units.

D-10—Multi Drillers

National Automatic Tool Co.—Bulletin No. 247 describes and illustrates the A-33 light sensitive machine for drilling and tapping small holes in small work and lists the feed arrangements available. The A-33B, air feed machine is also described and illustrated. Specifications for both machines and diagrams of the machines are included.

D-11—Abrasive Wheels

Charles H. Besly & Co.—New pocket-sized 48-page handbook for industrial users of abrasive wheels. It explains the advantages of Steelbac grinding discs, contains a standard marking system chart for Besly-Titan abrasive wheels and a series of price list tables. Other subjects covered include (1) types of grain used in making these abrasive wheels, (2) porosity control and (3) types and uses of coolants.

D-12—Pliers, Adjustable Wrenches

Plomb Tool Co.—Pliers, adjustable wrenches and pipe wrenches made by the company are described and illustrated in Bulletin No. 4728.

D-13—Permanent Magnets

General Electric Co., Chemical Dept.—New booklet gives all general information on permanent magnets as well as technical data on characteristics, design, properties and applications of the G-E material.

D-14—Hy-Jector Molding Machine

Rockford Machine Tool Co.—The new Rockford Hy-Jector molding machine for thermosetting plastics is fully described in a new bulletin, No. 147. Design features, production facts and figures and specifications are included in the bulletin.

EXIDE BATTERIES...as dependable as the Diesel Engines they crank

Exide Batteries have the *extra power* required to deliver the *extra speed* that Diesel engine cranking demands. They are ruggedly built to withstand the rigors of all climates and to assure trustworthy performance in all types of service... even where operating conditions are exceptionally severe.

Exide Batteries are cranking Diesel-powered trucks, buses and off-the-highway equipment. They are giving a good account of themselves in Diesel-electric locomotives, on ships, in power plants and many other applications. And wherever used, Exide Batteries are serving with dependability, long life and ease of maintenance.

Write today for a FREE copy of the Exide Catalog on Heavy-Duty Batteries. It gives you catalog data and information on how to get the most from your Diesel Cranking Batteries.

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BATTERIES

POWER

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

New Photoelectric Instruments For High Speed Engine Research

(*Continued from page* 39)

b, shown in plain view on the left, having two narrow slits. These slits are in close proximity to, and in partial register, with two other similar slits cut in the stationary plate *c*, shown on the right, which is mounted rigidly in between the light source *d* and photo cell *e*. Thus the two sets of slits, one in the movable plate *b*, and the other in the stationary plate *c*, govern the amount of light received by the photo cell in a linear relationship with the motion of the needle valve. The electric circuit diagram, Fig. 9, shows that the output of the photoelectric cell is fed to the grid of an amplifier tube, the current of which varies the voltage on the plates of a cathode ray oscillograph, thereby producing a vertical deflection of the cathode beam.

In order to test the accuracy of this instrument, the diagram obtained by it was compared to the point-by-point diagram obtained with another instrument shown in Fig. 10. In this, in line with the extension rod *a* of the needle valve, a micrometer is mounted in a holder *c* which is insulated by the insulator *d* from the nozzle. At the end of the micrometer spindle a stiff leaf spring is mounted, which bears against the extension rod *a* and is capable of a small deflection.

The nozzle and the micrometer are included in an electric circuit, other elements of which are a telephone *e*, a 6 v battery and a rotating contact disc *f*, driven from the injection pump shaft. The contact disc is made of insulating material and carries a conducting segment. A movable brush rides on the periphery of the contact disc. It can be visualized that the telephone is energized when the circuit is completed at both places, between *a* and *b*, and also at the contact disc. Regulating the gap between *a* and *b* by means of the micrometer, and exploring the phase by moving the contact brush at *f* the lift diagram of the needle valve can be plotted as the function of pumpshaft rotation. This method is the adaptation of the Bureau of Standards balanced pressure indicator for the exploration of periodic mechanical motion. The diagrams obtained by the photoelectric needle lift indicator developed in England by Dr. Kendall, and by the point-by-point method were in good agreement.

Car Frame and Crankcase Improved by Brittle Tests

(*Continued from page* 31)

knowledge that the convertibles of prewar vintage lacked the rigidity and freedom from noises enjoyed in closed body models. Controlled laboratory facilities equal to the task of testing a full-sized frame were lacking but through improvisation Packard was able to conduct tests which gave conclusive qualitative results.

The entire X-member section of the frame was coated with the brittle Stresscoat lacquer and dried. Then the frame was subjected to the usual torsional rigidity test to determine the location and direction of strains. The results of this test confirmed the recommendation of the frame maker to weld thick plates to the top and bottom flanges of the X-member rails. This resulted in the manufacture of convertible frames of exceptional torsional rigidity.

The other noteworthy project had to do with the improvement in the crankcase section of the engine for Super-Eight convertible. Now this engine was designed by the same people who have been responsible for making Packard engines for many years. But it was a completely new engine. It had subtle differences in its structure. When the engine was run on the dynamometer, observers immediately noted a noise due to vibration at moderate speed around 1500 rpm. Checks by sound equipment showed that the lower wall of the cylinder block crankcase section was in vibration.

This entire section was coated with Stresscoat lacquer and dried. The engine was run at room temperature sufficiently low to render the Stresscoat very sensitive to strains. As a result the engineers found an unmistakable pattern of strain at two separate areas as shown on the sketch reproduced here. Curiously enough these were located between main stiffeners. The introduction of substantial ribs at the central portion of the disturbed areas resulted in a new distribution of stiffeners which effectively eliminated noise and vibration. The "before" and "after" design is shown in the sketch. This study made it possible to find a potential source of trouble and to change the pattern equipment before the engine was released for production.

Stinson Adopts Alodizing Process

A simple chemical treatment for aluminum sheet and assemblies, said to give remarkable results in paint adhesion and resistance to salt water corrosion, is now in use at the Stinson Div., Consolidated Vultee Aircraft Corp., Wayne, Mich., in the processing of sheet metal parts for Stinson airplanes. Adopted less than two months ago, this treatment has eliminated a serious epidemic of paint trouble and holds promise of further economies.

The process, called Alodizing, employs a chemical bath containing Alodine made by the American Chemical Paint Co. Stinson has a battery of five process tanks in the shop, two of these being used for cleaning sheet metal that may be coated with oil or grease. As a general rule the fabricated parts that have been subjected to heating are free from oil or grease, do not require pre-cleaning, and can be Alodized without preliminary preparation.

Of the five tanks in this group, the first is a hot Oakite "61" bath, and the second is a cold water rinse, these tanks being used only where cleaning is required. The Alodine bath is held at 120 F and the work is immersed for 1½ min. This is followed by a cold rinse, and finally a hot acidulated rinse in a tank containing 1/10 of one per cent by weight of chromic acid in solution. Immediately following this simple dip treatment the aluminum parts, when dry, are ready to receive an application of sprayed undercoats prior to spraying the final finish.

Before this method was adopted Stinson had difficulty assuring good adherence of paint regardless of the preparation of the base material. According to the plant engineers, Alodine etches and coats the surface, producing a microscopic layer into which the finish is keyed by mechanical bonding, thus supplementing the normal adherence of paints.

In addition to the preparation of surfaces for painting, Stinson uses Alodine on interior aluminum parts for seaplanes, these being Alodized but not finished in any other way. It is claimed that this gives excellent protection against the action of sea water, produces more highly resistant than those duces surfaces more highly resistant than those finished by conventional techniques.

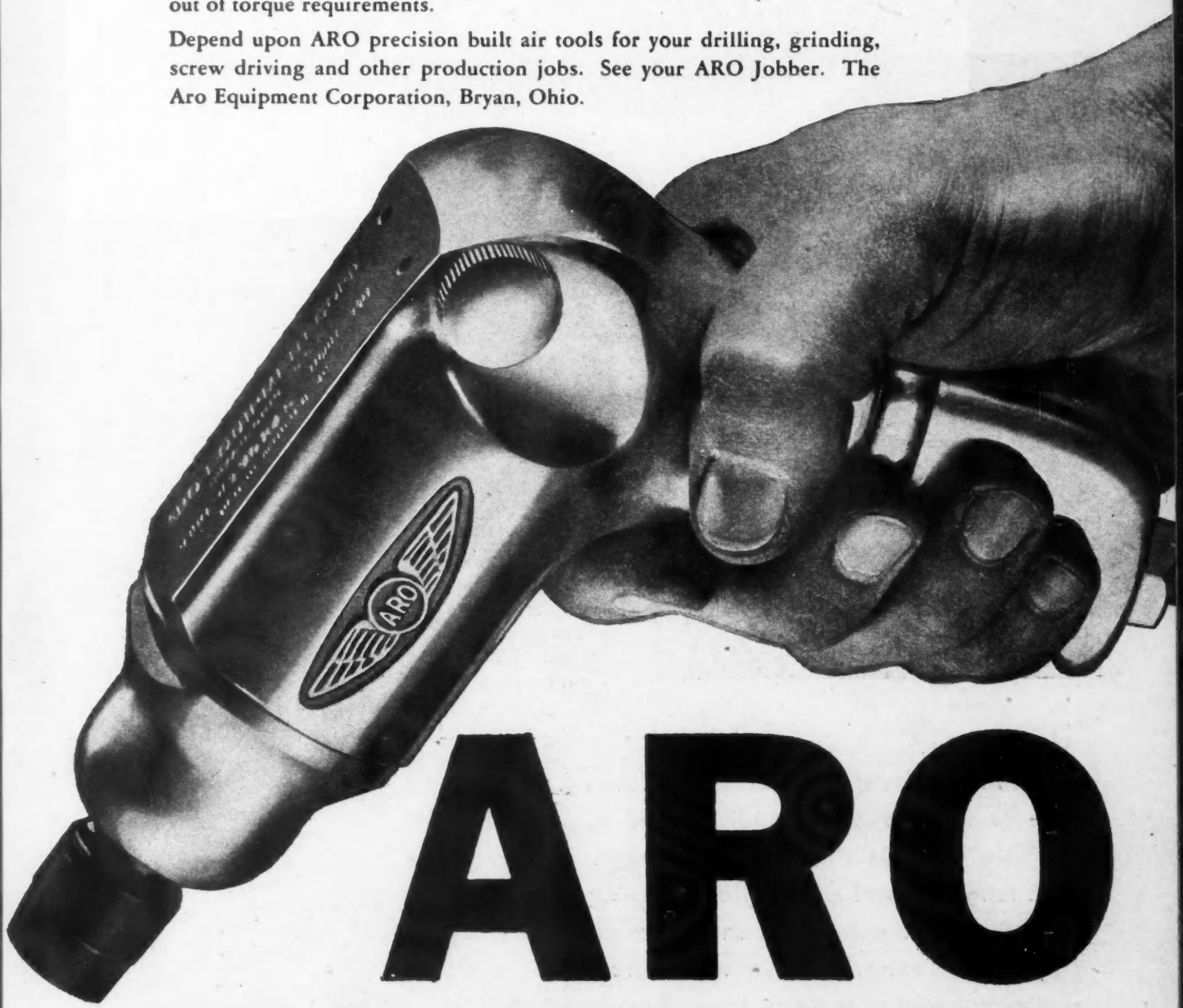
Japan to Make Small Cars

Japan will soon be making 300 bantam-size cars a year, under a recent authorization by Allied Headquarters. However, export is not contemplated; the users are specifically designated—Japanese doctors, police and Government agencies.

Get faster production
with IMPACT TOOLS

Speed up your assembly operations and cut production costs with ARO Impact Wrenches. Torque regulator on the tool takes the guess work out of torque requirements.

Depend upon ARO precision built air tools for your drilling, grinding, screw driving and other production jobs. See your ARO Jobber. The Aro Equipment Corporation, Bryan, Ohio.



ARO AIR TOOLS

Expansion in Tractor Industry

(*Continued from page* 54)

Considerable product modernization and development has already been made under supervision of the central planning committee headed by Mr. Phelps. Announcements will be made in the near future of greatly improved tractors to be completely equipped with hydraulic lifts for the control of implements operated by the tractors, increased production for the company's TNT plow which adds breaking up the plow pan beneath the field to the usual moldboard functions of turning the soil and a tracklaying tractor with rubber tracks. This latter tractor will be built in the company's Cleveland plant, and substantial expenditures will be required for its production.

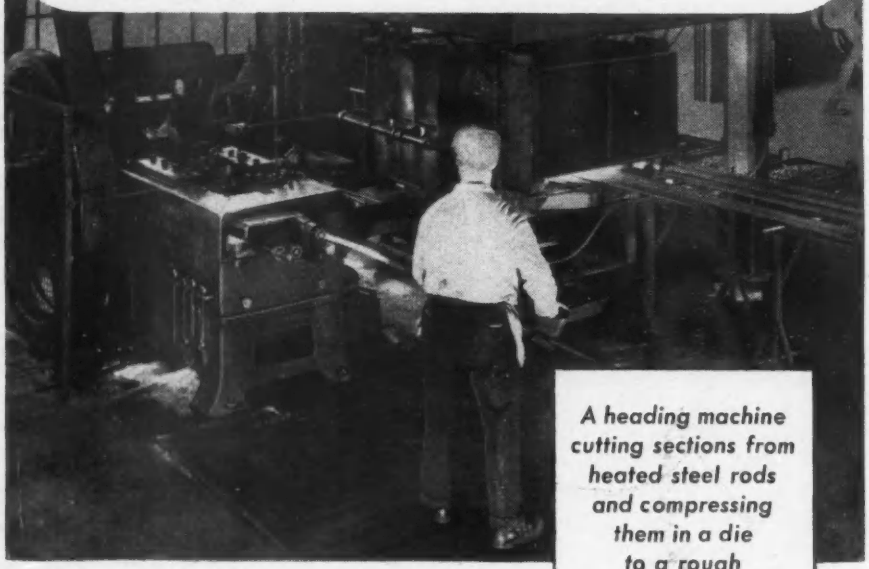
Recently completed and included in the $10 million expenditure has been an extensive modernization and mechanization of the malleable and gray iron foundries at No. 1 plant in South Bend.

Several manufacturers, in order to obtain the additional manpower, have found it necessary to supplement their factory expansion programs with sizeable housing projects. The additional capital this required however is self-liquidating over a period of years and has not been included in the announced plans of the companies involved.

Most industry statisticians during the early war years expressed the belief that the number of tractors used by farmers, then estimated at two million, would be increased to three million within ten years after the war's end. Now they are raising their sights and believe that the three-million mark will be attained before the end of the 1940 decade, and that a four-million mark is possible of attainment within a ten-year period.

This is How

STROM BALLS are Born



A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

Strom BALLS Serve Industry

Largest Independent and Exclusive Metal Ball Manufacturer

Aeronca Gets Contract For 439 Liaison Planes

A contract for 439 liaison planes was recently awarded to the Aeronca Aircraft Corp. by the U. S. Army. Anticipating deliveries at the rate of 60 a month, production is expected to start shortly. The order, in addition, included 30 per cent additional replacement spare parts.

Waco Discontinues Work on Aristocraft

Development and tooling of the Aristocraft, four-place personal plane, has been stopped by the Waco Aircraft Co., Troy, O. Unexpected development work, and increased material costs were among the reasons cited by Waco for discontinuing the Aristocraft.

Pittsburgh Plate Gets Forbes Varnish

The Pittsburgh Plate Glass Co. has acquired the Forbes Varnish Co. of Cleveland which will continue in operation as the Forbes Varnishes Div. of Pittsburgh Plate. Automobile, home appliance, machinery and many other specialized production finishes are made by Forbes.

Wind Tunnel For North American

To accelerate guided missile research, North Amercan Aviation, Inc., is operating the first wind tunnel in the West Coast aircraft industry. Current tests are being made at 1850 mph.

SPICER MANUFACTURING DIVISION OF DANA CORPORATION · TOLEDO 1, OHIO

Eight Diesel Models

(*Continued from page* 27)

new frames have pressed steel channel side members with ¼ in. angle stress absorber on ADC and ADF 750 models and ADC and ADCR 900 models; the others have ¼ in. channel stress absorbers.

The transmission setup varies with different models. Five-speed synchromesh overdrive is standard on the "750's," optional being the five-speed direct in fifth main transmission with or without a three-speed auxiliary. Standard on the ADC900 is the five-speed synchromesh direct in fifth, in combination with a three-speed helical constant mesh auxiliary. The ADCR900 has as standard the five-speed synchromesh overdrive; and a five-speed direct in fifth synchromesh as optional. The 950 and 970 models are fitted with the five-speed synchromesh direct in fifth, in combination with a three-speed helical constant mesh auxiliary.

The recirculating ball and nut sector type steering gear is used on all models, contributes greatly to steering ease. A 40-gallon fuel tank is mounted outside the right frame rail on all models. The radiator on all models has a vertical flat tube and fin core, is mounted on rubber, and has thermostatically controlled shutters and temperature control.

Rear axle equipment varies with different models as follows: On 750 models standard equipment is a two-speed full-floating axle with spiral bevel ring gear and pinion and radius rod drive. Selection of high and low ranges is by an air-operated shift, low range having a planetary reduction between the ring gear and differential. Ratios: 5.43 and 7.39 or 6.71 and 9.13. Optional, at extra cost: heavy duty two-speed axle, ratios 6.17 and 8.39 or 6.67 and 9.06; double reduction, ratios 6.42, 7.08, 7.84 or 8.74, with auxiliary transmission. The same type of basis two-speed axle is found on the ACDR900 with ratios of 6.17 and 8.39; or 6.67 and 9.07 as standard equipment.

ADC900 models are fitted with the double-reduction full floating axle and radius rod drive. The primary reduction has a hypoid bevel ring and pinion; secondary, helical spur gears. Available ratios are: 6.42, 7.08, or 7.84.

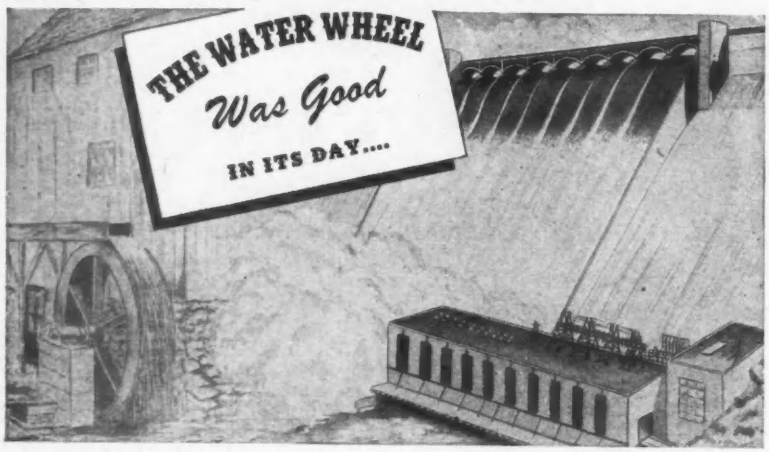
The 950 and 970 models are equipped with full-floating worm drive axles, the setup consisting of two driving axles with through drive to the second axle, floating spring suspension, and parallelogram arrangement of torque and radius rods. As optional equipment they offer double-reduction axles. Worm drive ratios on the 950 are: 4.72 or 6.17; on the 970: 6.80, 8.20, or 9.00. Double-reduction optional axle ratios on the 950 are: 6.84, 7.50, or 8.27; on the 970: 7.33, 8.15, or 9.11.

Hand brakes are of propeller shaft type—14 by 3 in.—with two shoes on the 750 and 900 models, four-shoe on the 950 and 970.

Main brakes are of heavy duty air-operated type with slack adjusters on all models. They are of cast two-shoe type with nickel iron drums on the ADC and ADCR 750; cast iron front and nickel iron rear on the ADFR and ADF 750 and on 900 models; cast iron front and rear drums on the 950 and 970.

Brake sizes are as follows: 17¼ by 3 in. is standard on the front for all models. On 750 models, the 17¼ by 5½ in. brake is standard at the rear. On the 900 models, 16½ by 7 in. is standard on the rear, while the 950 has 16½ by 6 in. The 970 offers 16½ by 7 in. with worm drive, 16½ by 6 in. if the optional double-reduction axle is specified.

(*Turn to page* 78, *please*)



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Improvement in design has produced the super hydro-electric plants and other engineering marvels of the present. In the metal-working field

Alodizing with

Alodine*

provides protection for both painted and unpainted aluminum comparable to that of anodically formed coatings but at a fraction of the cost in time, materials, labor, and equipment.

Alodizing aluminum means simultaneously coating and sealing the metal in an easily prepared chemical bath. Time: 2 minutes maximum. No current. No high temperatures required.

Simple, economical and effective, Alodine gives aluminum the great corrosion resistance and tenacious paint adhesion formerly possible only with costly and time-consuming processes.

* Trade Mark Reg. U. S. Pat. Off.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine *
Duridine *
Alodine *
Lithoform *
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RUST REMOVING AND PREVENTING
Deoxidine *
Peraline *

PICKLING ACID INHIBITORS
Rodine *

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

High-Volume Production

(*Continued from page* 35)

it is adjusted for length by contact with a cam and is gripped by a chain to hold it in this position. Snyder center drive lathes are used for turning both ends of the shaft simultaneously, employing a system of front and rear tool slides as well as a taper attachment at one end.

Axle shaft spline ends are cut in a battery of eight-spindle Cleveland Rigidhobbers. Because the shafts are cut while soft, these machines are adjusted for a feed of 0.090 in., an exceptionally fast operation. Keyways in the hardened and drawn shafts are cut in a Cincinnati mill, cutting two shafts at a time with milling cutters fitted with cemented-carbide blades. Axle shafts are finally ground to length in a special surface grinder, which has an eight-station barrel fixture.

Although the cycles of machine tools are fully automatic, requiring only loading and unloading, the OilGear machine for broaching the ring gear bore exemplifies complete automaticity, functioning without an operator. The blanks are completed in a Bullard Mult-Au-Matic and are moved down the chute to the Oilgear machine. In the act of dropping onto the table the gear itself starts the automatic machine cycle, followed by the movement of the broach and ejection of the broached part.

The first operation on the drive pinion forging reveals a tricky arrangement utilizing one of the new Milwaukee Duplex mills. Its feature is a long massive fixture designed to hold four drive pinions, two at each end. In operation, the fixture advances to the cutting position which has two stations, one for milling to length and the other for center drilling both ends of two pieces mounted one over the other. Upon completion of the cycle, the fixture moves back out of the machine on the table to permit the operator to swing the entire fixture 180 deg. At this point the two finished pieces are unloaded and another pair loaded. Meanwhile the fixture moves to the work station to mill and center the two pieces originally at the outer end. This Milwaukee Duplex mill arrangement is illustrated in Fig. 3.

Differential side gear blanks are machined overall in large six-spindle New Britain-Gridley chucking automatics while pinions are produced directly from bar stock and finished all over in a battery of six-spindle National Acme-Gridleys. The revolutionary Gleason Revacycle machine for automatically cutting bevel and side gears, already fitted with a magazine for feeding the blanks and an automatic unloading device for stacking the gears on racks, now has a device for automatically removing the burr on the large diameter. One cutting segment has been removed and replaced by a fly-cutter attachment for burring. Now the Revacycle is truly an amazing automatic bevel gear cutter.

The plant is equipped with a wide variety of special types of Ex-Cell-O machines for various operations. An unusual example features an automatic transfer fixture. The machine, illustrated in Fig. 4, is designed for the drilling of five holes in the axle tube flange. The operator constantly feeds the machine by loading tubes on the transfer fixture. The latter, in turn, moves two tubes into position for drilling, then unloads the finished pieces by a horizontal movement of the fixture, at the same time picking up two more tubes and placing them in position for drilling.

(*Turn to page* 76, *please*)

IMPORTANT
assembly savings

RECONVERSION TIME is cost-cutting time. Many of the foremost machinery builders are finding that by simply *peeling* precision laminations from Laminum shims, much costly machining is made unnecessary in accurately fitting bearings, gears, etc. These savings are specific, and large enough to be important. Want performance data?

Laminum shims are cut to your specifications. For maintenance work, however, stock shim materials are sold through industrial supply houses.

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LAMINUM
TRADE MARK
THE SOLID SHIM THAT peels FOR ADJUSTMENT

2218

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE *and* AVIATION INDUSTRIES

Minor reductions in general business activity are indicated. The *New York Times* index for the week ended June 7 stands at 145.1, as against 145.8 for the preceding week and 125.9 a year ago.

Sales of department stores during the week ended June 7, as reported by the Federal Reserve Board, equaled 292 per cent of the 1935-39 average, as compared with 250 per cent in the week before. Sales were 7 per cent above the corresponding distribution a year earlier, as against a preceding similar excess of 12 per cent. The total in 1947 so far reported is 11 per cent greater than the comparable sum in 1946.

Electric power production increased slightly in the week ended June 7. The output was 18.2 per cent above the corresponding amount in 1946, as compared with a like advance of 18.4 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 900,747 cars, 8.5 per cent more than the figure for the week before and 8.5 per cent above the corresponding number recorded last year.

Crude oil production in the week ended June 7 established a new record, averaging 5,064,299 bbl. daily, or 39,850 bbl. more than the preceding average and 368,649 bbl above the comparable output in 1946.

Production of bituminous coal and lignite during the week ended June 7 is estimated at 13,500,000 net tons, 5.9 per cent more than the output in the week before. The total production in 1947 so far reported is 39.5 per cent above the corresponding quantity in 1946.

Civil engineering construction volume reported for the week ended June 12, according to *Engineering News-Record*, is $158,140,000, or 31 per cent more than the preceding weekly figure and 14 per cent above the comparable sum in 1946. The total recorded for 24 weeks of this year is 2 per cent more than the corresponding amount in 1946. The increase in public construction is 17 per cent, but private construction is 7 per cent below that a year ago.

The wholesale price index of the Bureau of Labor Statistics for the week ended June 7 is 147.9 per cent of the 1926 average, as compared with 147.4 for the preceding week and 111.5 a year ago.

Member bank reserve balances increased $107 million during the week ended June 11. Underlying changes thus reflected include a reduction of $194 million in Reserve bank credit and a decrease of $158 million in Treasury deposits with Federal Reserve banks, accompanied by a decline of $8 million in money in circulation.

Total loans and investments of reporting member banks declined $318 million during the week ended June 4. A decrease of $44 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, $10,630 million, shows a net increase of $3,161 million in 12 months.

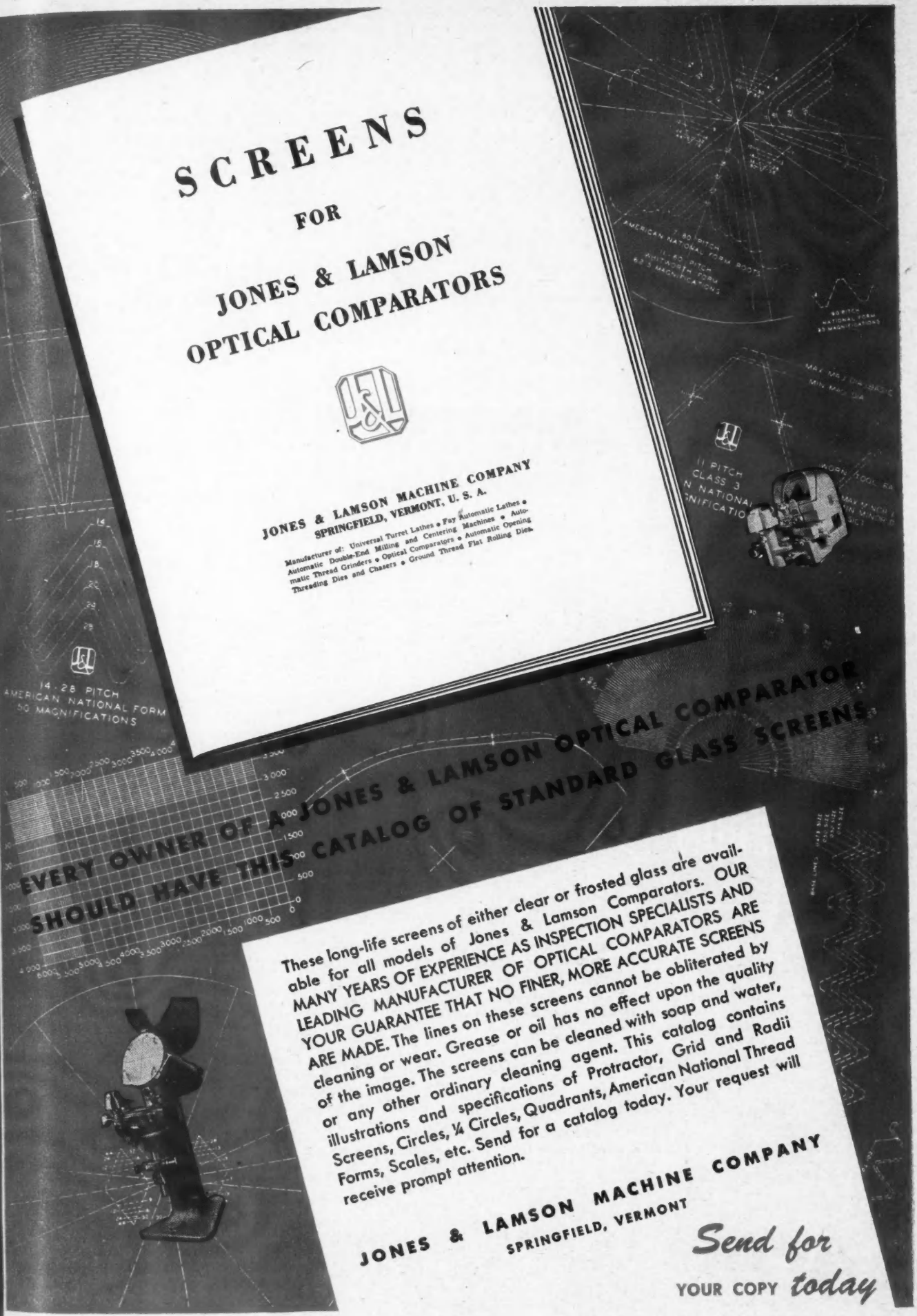
SCREENS

FOR

JONES & LAMSON OPTICAL COMPARATORS

JONES & LAMSON MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies.



EVERY OWNER OF A JONES & LAMSON OPTICAL COMPARATOR SHOULD HAVE THIS CATALOG OF STANDARD GLASS SCREENS

These long-life screens of either clear or frosted glass are available for all models of Jones & Lamson Comparators. OUR MANY YEARS OF EXPERIENCE AS INSPECTION SPECIALISTS AND LEADING MANUFACTURER OF OPTICAL COMPARATORS ARE YOUR GUARANTEE THAT NO FINER, MORE ACCURATE SCREENS ARE MADE. The lines on these screens cannot be obliterated by cleaning or wear. Grease or oil has no effect upon the quality of the image. The screens can be cleaned with soap and water, or any other ordinary cleaning agent. This catalog contains illustrations and specifications of Protractor, Grid and Radii Screens, Circles, ¼ Circles, Quadrants, American National Thread Forms, Scales, etc. Send for a catalog today. Your request will receive prompt attention.

JONES & LAMSON MACHINE COMPANY
SPRINGFIELD, VERMONT

Send for
YOUR COPY *today*

General News

(*Continued from page* 23)

Zinc

Prime Western continues to be the only grade either not in sufficient supply or balanced demand. Galvanizers' demand may be met, it is reported, by the debasing of higher grades with required impurities in the form of scrap by certain smelters. Lower grade Prime Western may be produced by adding scrap to higher grades of zinc, making a lower price possible, with no perceptible overall return loss.

Kaiser-Frazer Buys Round Oak Co. in Mich.

Kaiser-Frazer Corp. has supplemented its gray iron castings supply sources by the purchase of the entire facilities of the Round Oak Co. of Dowagiac, Mich., in a transaction involving $262,000 cash and other considerations.

FAMOUS "TOPS"

..both are SYMBOLS of FREEDOM

Like Liberty's torch the dependable Aetna "T" Type Bearing shines forth a message of freedom—from friction; from ceaseless attack on efficiency; and at key positions of hardest, most gruelling duty.

These distinctive features long since established the Aetna "T" Type Bearing as a trusted standby of most of the leading automotive manufacturers.

- permanent alignment of raceways—no eccentric thrust, no chatter, no excessive wear
- oil impregnated bronze retainer for smooth, silent bronze-to-steel contact
- permanently sealed-in lubricant

Let's talk about Freedom from Friction for your product. Aetna's long and varied experience is yours to command.

MAKERS of THRUST BALL BEARINGS, Standard and Special, ANGULAR CONTACT BALL BEARINGS, ROLLER BEARINGS, Special, BALL RETAINERS, HARDENED and GROUND WASHERS

AETNA BALL & ROLLER BEARING COMPANY
4600 Schubert Avenue — Chicago 39, Illinois
In Detroit: Sam T. Keller
7310 Woodward Avenue — Phone: Madison 8840-1-2

Aetna BALL & ROLLER BEARINGS

Bendix Buys Test Plant In South Bend from WAA

Bendix Aviation Corp. has bough three parts of an aircraft testin plant it operated during the war i South Bend, Ind., from the Wa Assets Administration for $80,00 The purchase included an engine tes house, a landing gear testing build ing, and an air box laboratory, al adjacent to the original Bendix plan in South Bend.

Shot-Peening Increases Rear Axle Life of Dodge Trucks

Dodge trucks now feature shot peened rear axle shafts, which ar reported to more than double th fatigue life of ordinary shafts. L. F Van Nortwick, director of truck sale of the Dodge Div., Chrysler Corp has said that this improvement ha been made with no increase in sell ing price. Thousands of small stee shot bombard the axle shaft with ter rific force in the shot-peenin process.

Commerce Trade List Covers Mexican Automotive Business

A list comprising the names, ad dresses and business details of 22 Mexican automotive equipment im porters and dealers has been issue by the Office of International Trade Department of Commerce. The price is $1.00, and there are similar lists available for almost every country in the world, in addition to lists cover ing other trade categories, each priced at $1.00.

Eaton Buys Plant From WAA in Battle Creek

The Eaton Manufacturing Co. has purchased for $801,659, the Government-built plant adjoining their present Battle Creek, Mich., properties from the War Assets Administration. Additional space of 360,000 sq ft, when added to a Government-built building acquired a year ago, is now provided, and pre-war space at Battle Creek is now more than doubled.

New Auto-Lite Plants Will Add Million Sq Ft

Electric Auto-Lite Co. expects that before the end of the year three new plants now being equipped will be in operation. Adding about a million sq ft, the new plants will, it is anticipated, furnish the necessary space for new products and relieve some congestion in present plants.

(*Turn to page* 74, *please*)

Announcing

A NEW LINE OF PRECISION CONTOUR TURNING AND BORING MACHINES

Accurate and Fast — Cam and Air Actuated

Featuring **1.** An endless variety of contours or combinations may be generated with a single-point tool. Besides all the regular jobs of straight precision boring and turning, facing and chamfering, it will produce lands, recesses, flanges, steps, counterbores, and radii.

2. A disc type cam for each table gives positive action consistently throughout the day — from the first to the last piece — uninfluenced by temperature changes.

Model 36

3. Through positive cam action, tool approaches on rapid traverse to within .005 of the work and immediately starts to feed. Tool may cut on feed-in or drawback stroke, or both for rough and finish cuts. On return stroke, tool jumps clear eliminating drag off marks. When moving between intermittent or successive cuts, tool goes into rapid traverse.

4. Uniform temperature, anti-friction bearings, and super-precision spindles provide spindle speeds up to 7,500 RPM. Mechanical precision chucking operated by air cylinders. Neither chucking nor unchucking operation affects preload or position of spindle bearings.

5. Only one dimension need be inspected on any one set-up, regardless of the number of diameters produced by any one single-point tool. Cams control and positively repeat from piece to piece.

6. Set-up of machine depends entirely upon nature of job. Work may be rotated in spindles or mounted on table, loaded from the front of the spindle or through the spindle. Spindles may be raised, lowered, or separated. Two spindles are standard, but more may be added. Changing job set-up simply requires replacing two cams, setting tool for size and changing chucks.

THE NEW BRITAIN MACHINE CO. NB

IN THE MIDST OF EVERYTHING AT THE SHOW

You may see this machine in operation in our Booth No. 311 at the Show. We will also have a complete line of six spindle automatic screw machines, four, six and eight spindle chucking machines, a double end chucker, and a new revolutionary turret lathe. We'll be seeing you September 17.

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

N-01060

Presenting a

REVOLUTIONARY ADVANCEMENT* in WARNER ELECTRIC BRAKES

NEW

16½" x 5" and 16½" x 7" Sizes

NEW

Two-Shoe Construction

NEW

For More Effective Stopping Power

These big, new, powerful Warner Electric Brakes — with their two-shoe hinge construction, incorporate the most modern and advanced brake engineering — and provide an entirely new concept of *effective stopping power.*

INSTANTANEOUS, POSITIVE ACTION As with all Warner Electric Brakes, positive-acting braking power is developed within the brake itself. Because the braking mechanism is *electrically controlled,* there is no time lag. Regardless of distances from cab to rear trailer wheels, any amount of stopping power is *instantly available.* Even with this remarkably fast action, the larger, wider, two-shoe brake operates with velvety smoothness never before achieved in brakes of any other type.

UNMATCHED ECONOMY The new Warner Electric Brakes are inexpensive to install. Use only as much current as a tail light. Require minimum servicing thus preventing costly delays and tie-ups of equipment.

CONTROLLED BRAKING POWER Driver can pre-set "Vari-Load" dial on dash to meet load and road conditions.

SYNCHRONIZED OPERATION WITH EITHER AIR OR HYDRAULIC SYSTEMS Warner Controller synchronizes hydraulic, vacuum or air brakes on tractor with Electric Brakes on trailer. Regular tractor foot pedal then operates both systems *together.*

ASSURED DEPENDABILITY The new two-shoe Warner Electric Brakes assure years of dependable operation. Warner Electric Brakes have been performance-proved by leading tractor-trailer operators during many years of efficient, trouble-free service.

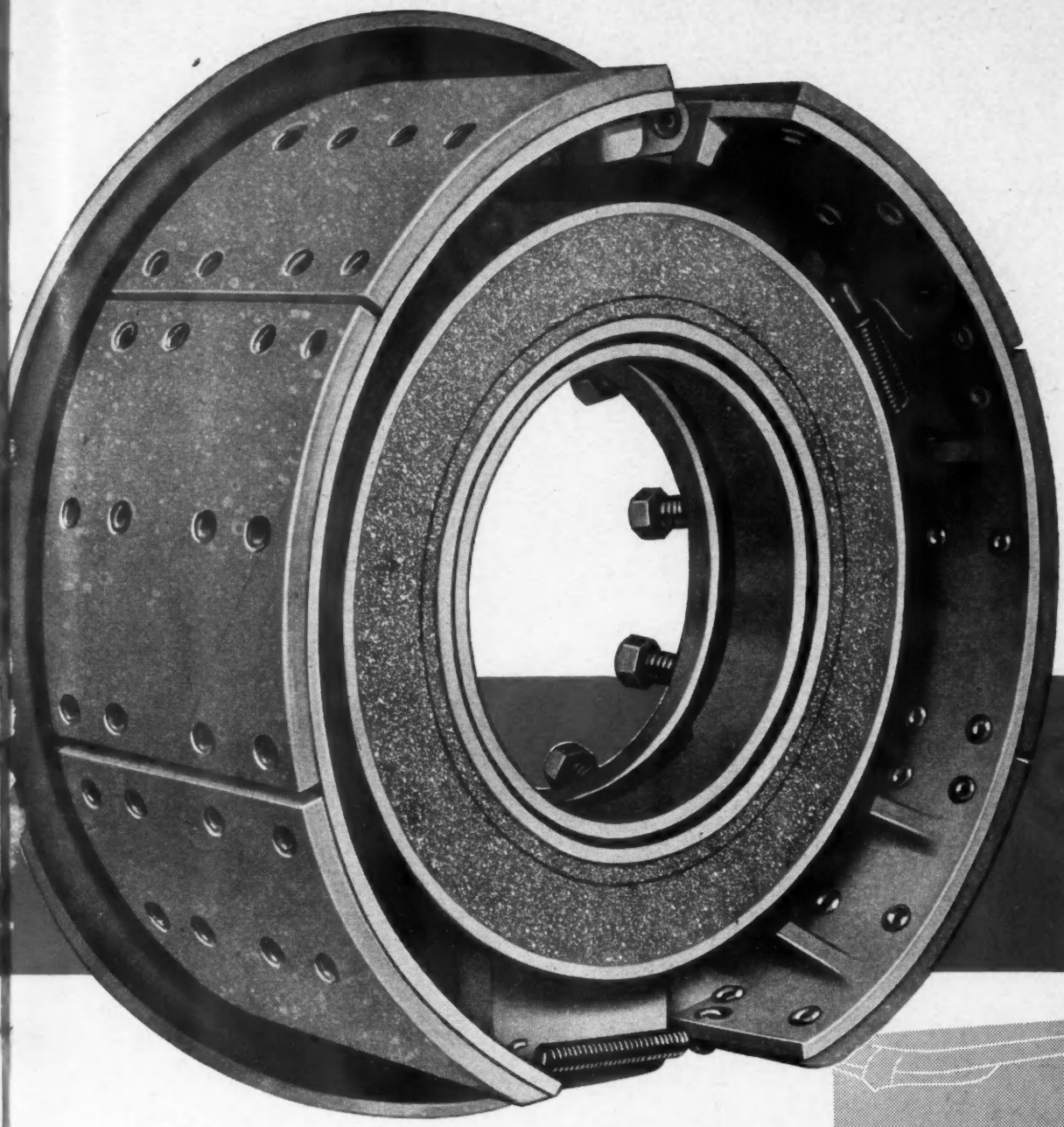
GREATER SAFETY When both the tractor and trailer are equipped with Warner Electric Brakes their *instantaneous* "stopping power" under *absolute control* assures greater safety. All brakes "come in" at the same instant, but with varying *amounts* of power. Therefore, rear trailer wheels get the *effect* of coming in first — and the tendency to skid or jackknife is prevented, thus giving greater protection to the driver and load — and avoiding costly repairs or tie-up of equipment.

For maximum performance and satisfaction, standardize on Warner Electric Brakes. Write for illustrated literature explaining all their many advantages.

WARNER ELECTRIC BRAKE MFG CO.

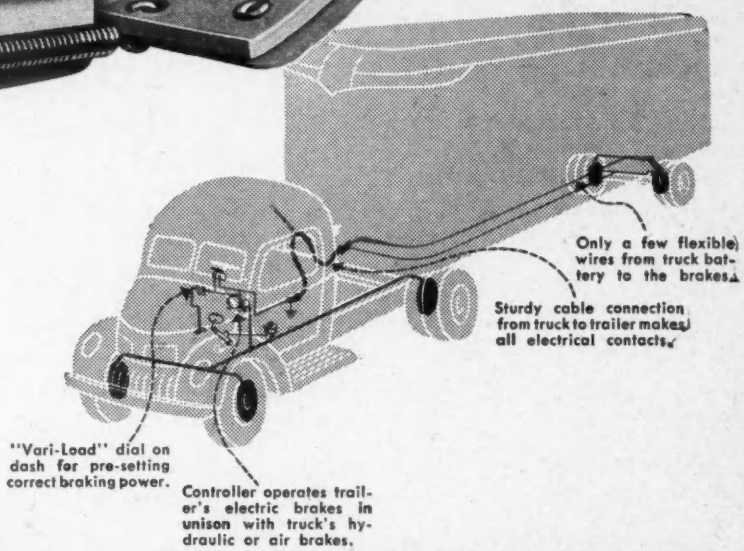
BELOIT, WISCONSIN

Specialists in the manufacture of Electric Brakes since 1927



* **REVOLUTIONARY ADVANCEMENT**

More rugged construction, rigid shoes, longer lining life, smoother control and dependable performance under severe conditions.


Only a few flexible wires from truck battery to the brakes.
Sturdy cable connection from truck to trailer makes all electrical contacts.
"Vari-Load" dial on dash for pre-setting correct braking power.
Controller operates trailer's electric brakes in unison with truck's hydraulic or air brakes.

WARNER
ELECTRIC BRAKES
SINCE 1927

No other brakes equal the new Warner Electric Brakes for simplicity of design and construction. Full clearance under tractor and trailer . . . nothing to get knocked off, leak, chatter or freeze. No exposed braking equipment . . . no rods to rattle . . . no tubes to split . . . no troublesome boosters and hose connections. One rugged all-purpose Electrical Cable Connection provides contacts for brakes, running lights, parking lights, stop and turn signals — ALL electrical contacts. As easy to plug in as a radio.

General News

(*Continued from page* 70)

3 Big Piston Ring Makers In England Form Combine

Three of the leading manufacturers of piston rings in England, British Piston Ring Co., Hepworth & Grandage, and Wellworthy Piston Rings, have formed a holding company, the Associated Engineering Holdings, Ltd., which will acquire all or part of their issued share capital.

Britain Drops Car Tax To Flat £10 Annually

A flat annual tax of £10 after Jan. 1, 1948, upon all passenger cars licensed in Great Britain was recently announced by the Chancellor of the Exchequer. This will replace the current system of taxation of 30 shillings per 100 cc, or about one dollar per cu in. An article entitled "British Look for New Tax System to Boost Car Exports" in the April 1, 1947, issue of AUTOMOTIVE AND AVIATION INDUSTRIES discusses the possible effects of a flat tax system.

Form Automobile Old Timers Unit in Pennsylvania

Members of the Automobile Old Timers who are Pennsylvania residents organized a State Council on June 11 in Philadelphia. Charles S. Snyder, honorary president; John H. Fassitt, president; J. Maxwell Smith, vice president; Herman P. Schade, vice president; and William Phillips, secretary, were elected officers of the new organization.

Why Business Needs Adequate Reserves

1. Adequate reserves are necessary to keep a business strong financially, and thus reduce the hazards associated with the downward fluctuations in the business cycle.

2. Adequate reserves absorb a portion of the higher earnings which result from abnormally high inventory values, and set up a safety fund against subsequent inventory losses, for use in time of definite need.

3. Adequate reserves aid in assuring the availability of corporate funds for expansion, modernization, and continued growth of the individual business.

4. Adequate reserves enable a business to maintain the strong financial position that helps it meet low-cost competition, improve its equipment and its products, and stabilize employment.

From a pamphlet by Dr. John M. Chapman, Assoc. Professor of Banking, Columbia University.

Bimetal Camshaft Casting Used in British Ford

The Ford company in Great Britain has been using a bimetal casting for the camshaft of their four cylinder model since production was resumed at the end of the war. The part involved uses a standard gray-iron casting, except that the center bearing includes a distributor gear. The heat-treated gray iron was not hard enough to permit the use of this material and obtain good wearing properties for the gear, so this bimetal casting system was developed. It utilizes a separate casting for the gear with 1.3 per cent carbon plus silicon-chromium alloy material, which is cast with two crossbars through the center. This gear casting is then heat-treated to a Brinell hardness of 187 to 241 for machinability. Then it is set in the mold and gray iron is run around it, being cast in the normal manner. The two crossbars serve to fix the iron to the gear. The cams are flamehardened after the teeth are cut into the gear, and the gear teeth are also flamehardened and quenched in oil.

(*Turn to page* 82, *please*)

POWER!

PORTABILITY!

Take It *To* the Job!
—built by THEW SHOVEL CO.
—Springs by TUTHILL

GOING *to* the job—lifting live, heavy, concentrated loads—saving time and money—are all in a day's work with this Lorain Moto-Crane equipped with TUTHILL Alloy Steel Springs. Unit built by THE THEW SHOVEL CO., Lorain, O.

Sturdy and strong—set far apart on the Moto-Crane unit to provide a wide, stable base and prevent side-roll—TUTHILL Springs withstand heavy shocks and sudden impacts. Auxiliary booster springs help absorb rebound and operating shocks.

Tuthill makes a complete line of leaf springs, standard or special. What are your requirements?

WE RECOMMEND TUTHILL FOR QUALITY SPRINGS

TUTHILL SPRING CO.
760 W. Polk St., CHICAGO 7, ILL.

Quality Leaf Springs for Sixty-seven Years

ENGINEERS, for basic information about Sirvene, you may have a copy of "Engineering with Sirvene," free, by writing SIRVENE DIVISION, Dept. 1317
Engineering with SIRVENE
Sirvene Serves
at the
HEART OF THE
MECHANISM

Wherever extraordinary or difficult operating conditions prevail, Sirvene pliable parts deliver dependable service at the very heart of the mechanism. They may control fuel intake, maintain delicate air pressure and fluid ratios, or provide an effective seal against mud, dirt, oil, water and other solubles. In each application Chicago Rawhide engineers custom-develop the Sirvene part from special formulae so that it meets exact specifications in design, elasticity or hardness, resilience, compression set, temperature resistance and tensile strength. Whenever your designs require unusual molded parts, investigate Sirvene first.

SIRVENE

THE *SCIENTIFIC* COMPOUNDED ELASTOMER

A Product of the Synthetic Rubber Division

CHICAGO RAWHIDE MANUFACTURING CO.

1305 Elston Avenue — Chicago 22, Illinois

Sirvene products include diaphragms, boots, gaskets, oil seals, washers, packings, and other special molded mechanical pliables.

Sirvene Engineers are pioneers in the field of scientific compounded elastomers. Since 1929, they have acquired an unequalled background of research, development and manufacturing experience. This unique reservoir of experience is always at your service.

New York • Philadelphia • Detroit • Los Angeles
Cleveland • Boston • Pittsburgh • San Francisco
Cincinnati • Portland • Syracuse • Peoria

DOWN IN WARRINGTON, FLORIDA

Back in 1937, when the Peoples Water Service Company bought their first Layne Well Water System to serve the city of Warrington, Florida, they had only 263 connections. But Warrington, being a fine home city, grew larger and larger. By 1941 a second unit was needed, and being guided by an appreciation of known quality, none but a Layne Well Water System was to be considered. In 1945, connections had increased to 3,200, so again additional water supply was needed.

Peoples Water Service Company now have their third Layne Water System . . . one of the finest and most complete in the entire state. Powered with a 100 h.p. electric motor, turning at 1170 r.p.m., this new system is producing 1150 gallons of water per minute. The well is underreamed and packed with 20 yards of sized gravel.

Standardization on Layne Well Water producing equipment, was a very wise move. Production cost of water is exceptionally low and dependability of equipment is a major asset.

For further information on Layne Well Water developing service, address Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.

LAYNE PUMPS for lakes, rivers, reservoirs, irrigation, for any use where large quantities of water must be produced at low cost. Sizes range from 40 to 16,000 gallons per minute, powerd by electric motor, V-belt or right angle gear drives. Write for Layne Pump Catalog.

LAYNE

WELL WATER SYSTEMS
Turbine Pumps

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Western Co. of Minn., Minneapolis, Minn. ★ International Water Supply Ltd., London, Ont., Can. ★ Layne-Hispano Americana, S. A., Mexico, D. F.

High-Volume Production

(*Continued from page* 67)

Rehnberg-Jacobson special drilling machines are used for the axle tubes. These are vertical machines with three to six heads arranged for handling two tubes at a time and drilling and tapping as required.

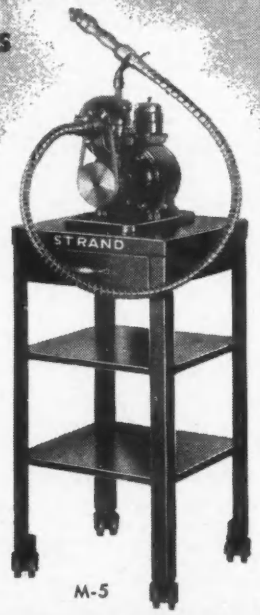
Ultra-Lap has contributed several outstanding finishing machines for bevel pinions. These are three-head, three station units arranged for finishing the spherical radius on the back face of the pinion. The blanks are chucked in the fixture, then the table indexes around so each blank is progressively presented to each of the three heads for the following operations: rough, finish, polish.

All gears are carburized in Surface Combustion continuous carburizing furnaces. The drive pinions and differential gears are transfered to an oil quench tank and the ring gears are quenched in the new Gleason quenching machines having automatic table operations for loading, quenching and unloading. Following quenching, gears and pinions are placed in baskets hung on a monorail conveyor system which carries them through a Niagara washer, then through an ACP Deoxidine bath followed by a hot water rinse. The resulting gear after this treatment is free of all carbon smudge or scale and again no shot blasting equipment is necessary.

Workers at Salisbury are on an incentive basis and are paid on the basis of acceptance of product. To reduce spoilage and rejections, each machine operator is supplied with a full set of gages to permit him to check his setup. Inspectors are stationed at the end of the line and handle both bench and floor inspection. Floor inspection requires checking at each machine two or three times a day. Bench inspection is based upon a 10 per cent sampling procedure. In practice, if sampling uncovers no more than a specified minimum number of defects, the lot is accepted. If rejects exceed the specified number, the entire lot is held up and inspected 100 per cent. Some parts require 100 per cent inspection. Among these are carriers and gear sets, the Rockwell testing of axle shafts and in general all hardness testing. Finished assembled axles are tested 100 per cent to assure freedom from noise and excessive back-lash.

You can do any of these jobs
FASTER-EASIER-BETTER
with Strand Flexible Shaft Machines

Grinding · buffing · polishing · sanding drilling · reaming · rotary filing · wire brushing · screw driving · nut setting wood filler rubbing · rasping



Strand machines provide PORTABLE rotary power at CONSTANT speeds with dependable results and less operator fatigue. Ruggedly built for years of steady use. Hundreds of attachments easily interchanged—125 types and sizes—vertical and horizontal models from ⅛ to 3 H.P.

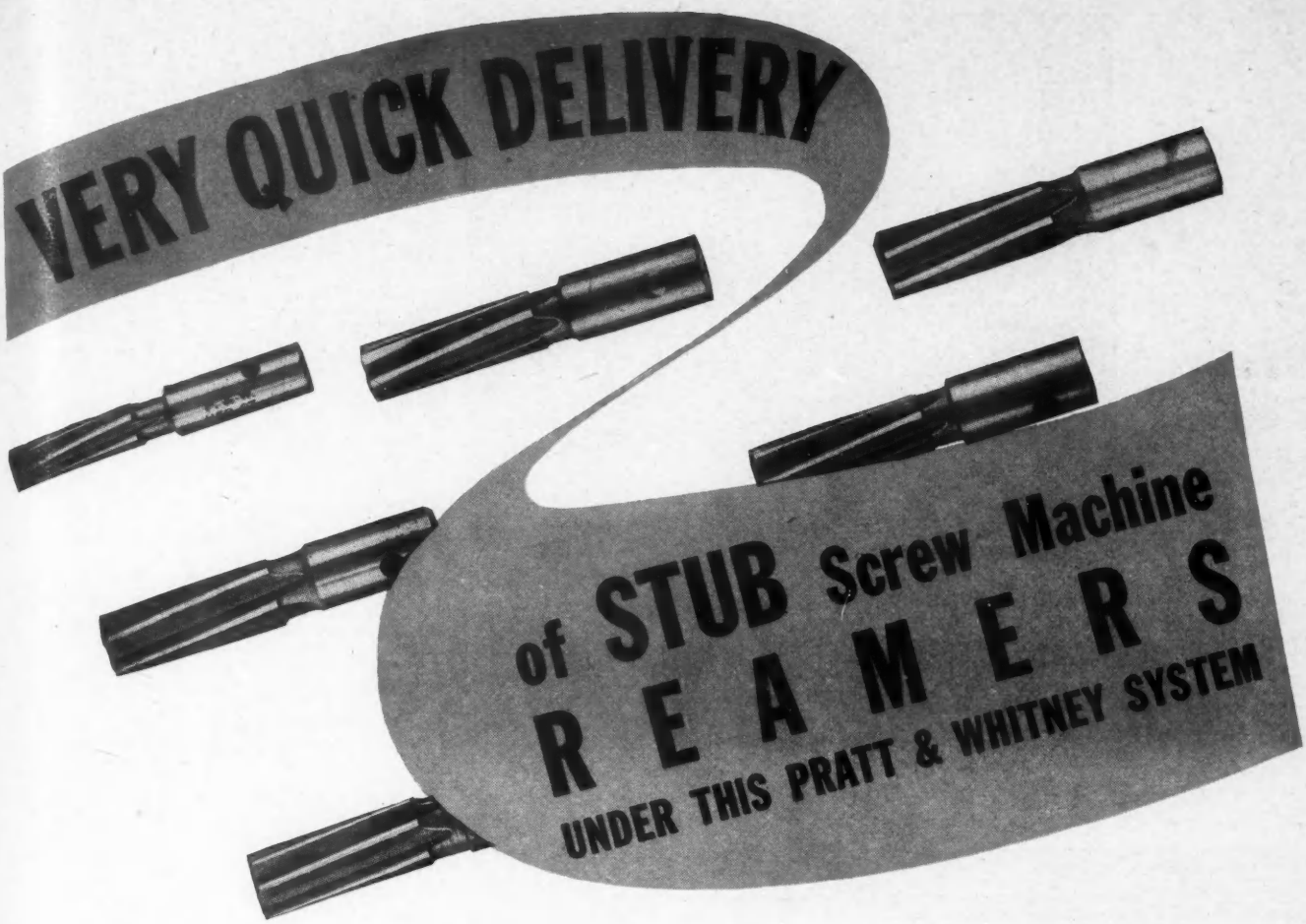
M-5

DISTRIBUTORS IN ALL PRINCIPAL CITIES
Send for CATALOG showing complete line

Strand
FLEXIBLE SHAFTS

N. A. STRAND & CO.
5002 NO. WOLCOTT AVE.
CHICAGO 40, ILL.

VERY QUICK DELIVERY



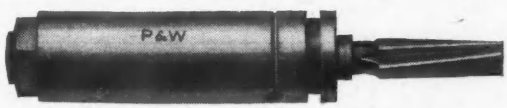
of STUB Screw Machine REAMERS UNDER THIS PRATT & WHITNEY SYSTEM

Need stub screw machine reamers of definite decimal sizes—but *FAST?* They're 90% ready for you at P&W. And you get *very quick delivery.* Here's how:

Hardened, ready-to-grind blanks are carried in stock. Your order comes in. We draw the proper size blanks from stock, grind them to your specified size — and SHIP PROMPTLY.

Costs are low because they're mass-produced. Performance is tops because they're P&W engineered of high-speed steel for toughness and free cutting. Every reamer receives the time-tested diamond blue treatment for maximum wear life. Stock reamers are left-hand spiral. Right hand, straight-fluted and special-dimension reamers can be supplied to order at reasonable prices and deliveries.

Cut costs. Standardize on P&W Stub Reamers. Get the facts. Ask your P&W Engineer, or use the coupon for complete details.



EFFICIENT REAMER HOLDER

You ream accurately within close tolerances with this holder and P&W Stub Screw Machine Reamers.

Delicate alignment is possible with the well-balanced floating feature. Use individual bodies for each shank diameter or bushing adapters for a single body to fit all Stub Reamers.

Pratt & Whitney

Division **Niles-Bement-Pond Company**

West Hartford 1, Connecticut

PRATT & WHITNEY
Division **Niles-Bement-Pond Company**
West Hartford 1, Connecticut

Please rush literature describing P&W Stub Screw Machine Reamers.

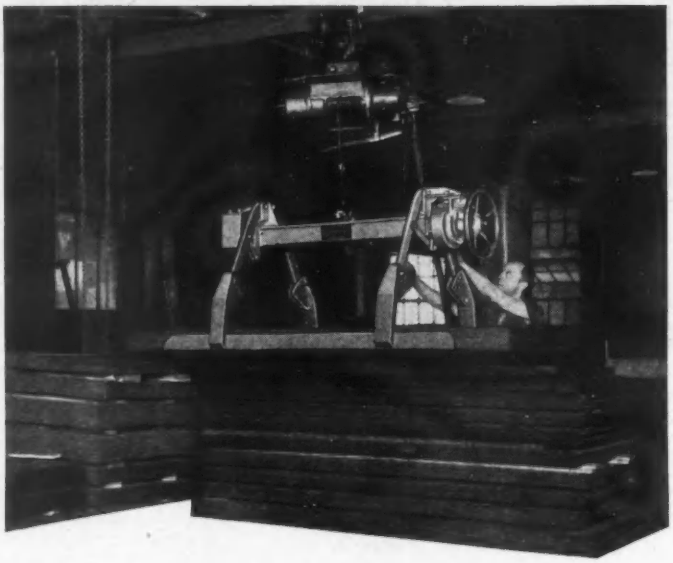
*Name*_____

*Title*_____

*Company*_____

*Address*_____

Profits Begin Here . . .



When carloads of sheet stock are unloaded at the receiving room, actual manufacturing costs begin. But, when sheet stock is unloaded and carried into storage or to the machines with C-F Sheet Lifters, these costs are minimized—stock damage is eliminated and your end profit begins. Because C-F Sheet Lifters, under one man end or remote cab control, handle more sheets per load, safer, faster and more economically, they are the logical answer to the demand for modern, low cost materials handling.

There are C-F Lifters in capacities from 2 to 60 tons or larger, in standard or semi-special designs to meet any sheet or materials handling requirement. Write for new Bulletin just off the press.

Cullen-Friestedt Co., 1322 S. Kilbourn Ave., Chicago 23, Ill.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

If you have a SPECIAL PROBLEM

in any of these operations, where precision work is demanded and where greater production at man-hour savings is paramount—

• BORING—rough, semi-finish and finish • MILLING (special types) • STRAIGHT LINE DRILLING • UNIVERSAL ADJUSTABLE SPINDLE DRILLING • HONING • TAPPING • REAMING • COUNTERBORING • VERTICAL AND WAY-TYPE EQUIPMENT . . .

then a Moline Multiple Spindle Specially Designed machine tool is your answer. Moline tools are ruggedly built and engineered to fit your PARTICULAR requirements, they're made to last for years, they're easy to change over to other jobs, they do better work at less cost and stand up to it longer.

For YOUR special problem, go "HOLE-HOG," write us for any information you may need.

MOLINE TOOL COMPANY
100 20th Street Moline, Illinois

CALENDAR

Conventions and Meetings

Institute of the Aeronautical Sciences, Annual Summer Mtg., Los Angeles, Aug. 7-8
Soc. of Automotive Engineers—West Coast Transportation & Maintenance Mtg., Los Angeles....Aug. 21-23
Natl. Air Races, Cleveland..Aug. 30-Sept. 1
Amer. Soc. of Mechanical Engineers—Fall Mtg., Salt Lake City.....Sept. 1-4
Amer. Soc. of Mechanical Engineers—Ind. Instrument & Regulators Div., Chicago .....Sept. 8-9
Instrument Society of America Conference, Chicago .....Sept. 8-12
Society of Automotive Engineers—Tractor Mtg., Milwaukee....Sept. 17-18
Natl. Machine Tool Builders Assoc. Machine Tool Show, Chicago, Sept. 17-26
Soc. Automotive Engineers, Aeronautic Mtg., Los Angeles .....Oct. 2-4
Amer. Soc. of Mechanical Engineers, Petroleum Mech. Eng. Conf., Houston, Tex. .....Oct. 6-8
Natl. Conference of Industrial Hydraulics, Chicago .....Oct. 16-17
Soc. of Automotive Engineers, Production, Cleveland .....Oct. 20-21
Amer. Soc. Tool Engineers—Semi-Annual Mtg., Boston.....Oct. 30-Nov. 1
Amer. Society of Body Engineers, Annual Tech. Convention, Detroit, Nov. 5-7
Society of Automotive Engineers, Fuels & Lubricants Mtg., Tulsa.....Nov. 6-7
Society of Automotive Engineers-Air Transport Mtg., Kansas City..Dec. 1-3
Amer. Soc. of Mechanical Engineers, Annual Mtg., Atlantic City....Dec. 1-5
Automotive Service Industries Show, Chicago .....Dec. 8-13
Soc. of Automotive Engineers Annual Mtg., Detroit .....Jan. 12-16

Eight Diesel Models

(*Continued from page* 64)

Propeller shafts on the 750 and ADCR900 are of tubular type with needle bearing joints, the center joint being supported by a rubber-encased sealed ball bearing. The ADC900 has two close coupled needle bearing joints with a splined shaft and yoke between the main and auxiliary transmissions; and two needle bearing joints and tubular shaft to the rear axle. The 950 and 970 hook-up is similar to the ADC-900 except that tubular shafts run to the forward rear axle and between the two rear axles.

The spring setup on the 950 and 970, dual axle models, consists of semi-elliptic springs at the front, reversed semi-elliptics at the rear. The latter are attached to ball bearing mounted trunnion brackets at the center. The flat ends contact wear plates on the axle housings. The other models use semi-elliptic springs front and rear in combination with auxiliary springs.

Minimum tire equipment for all models is 10.00-20-12-ply front, and rear duals, on 10-stud forged Spoksteel wheels. Other sizes are available.

WHERE DIAMOND VULCANIZED FIBRE FITS INTO PRODUCT DESIGN.....

There is no end of profitable applications for this versatile material. It is used in a multitude of mechanical, structural and electrical applications because of its unique combination of lightweight, strength, toughness, resistance to wear and abrasion, excellent arc-resistance and good dielectric properties.

Diamond Vulcanized Fibre is available in sheets, rods and tubes which are easily and cleanly fabricated on woodworking or metalworking machinery. It can be formed and punched; cut and sawed; drilled and tapped; turned, threaded and reamed . . . or, if you wish, we can supply the parts you need fabricated to your specifications.

Long experience in fibre application engineering, in connection with our complete line of laminated (Dilecto) and molded (Celoron) plastics, enables us to render unbiased recommendations for the best application of fibre to the solution of your mechanical and electrical problems. Just call in a Continental-Diamond Technician—or write for your Continental-Diamond Fibre catalog.

C-D NON-METALLIC PRODUCTS

DIAMOND VULCANIZED FIBRE

VULCOID—Resin Impregnated Vulcanized Fibre.

DILECTO—Thermosetting Laminated Plastics.

CELORON—A Molded Phenolic Plastic.

MICABOND—Built-up Mica Electrical Insulation.

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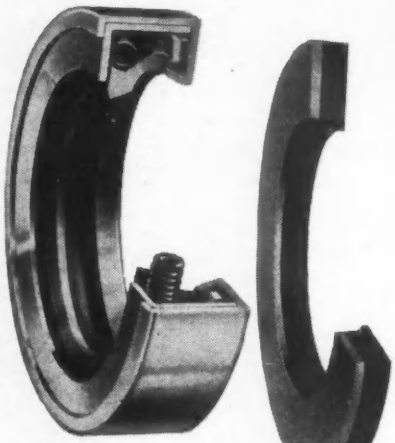
Syntech*

Precision-molded synthetic-rubber for longer, better sealing



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Oil Seals... Compact National Syntech Oil Seals are supplied for almost any rotating shaft application, in almost any size or style. They are available with single or double-wipe sealing members, tandem or opposed, and can be supplied in spring-loaded or springless-types. Design of sealing lip provides limited shaft contact, for maximum power economy.

NOW...National Syntech seals are proving their superiority on a wide variety of demanding applications

The low coefficient of friction of their precision-molded, synthetic-rubber sealing members gives them unique ability to survive runout, abrasion and high operating temperatures. Syntech seals are unaffected by acids, salines or other deteriorants found in common industrial application. They repeatedly perform at zero leakage over periods greatly exceeding ordinary oil seal life. And they often make possible reductions of sealing friction as high as 70%.

National Syntech Oil Seals are listed by shaft diameter in the new Syntech Catalog. Send for your copy—today.

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*TRADEMARK REG.

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"O" Rings...Available in quantity

"O" Rings... These new "O" Rings perform successfully on simple gasket installations where no pressure is involved, or on applications where pressures range as high as 5000 psi. They are used in reciprocating, oscillating, as well as static applications. They operate successfully on precision-engineered equipment, and on designs permitting of wide tolerances. They have great natural resiliency, yet possess an inherently low coefficient of friction. They are available in two specifications...commercial and military. The commercial grade is preferable...and more economical...for applications where low temperature extremes are not encountered.

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This authoritative "O" Ring Manual offers engineers a comprehensive round-up of current data on installation, use and applicability of "O" Rings. It is fully documented with numerous tables and drawings of great value to designers. Many typical applications... reciprocating and static...are pictured in detail. Cutaway and machine drawings show use of National leather anti-extrusion rings and National Syntech Dust Seals in mechanisms sealed with "O" Rings. "O" Rings, anti-extrusion rings and dust seals are listed by size in easy-to-read tables.

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1465

General News

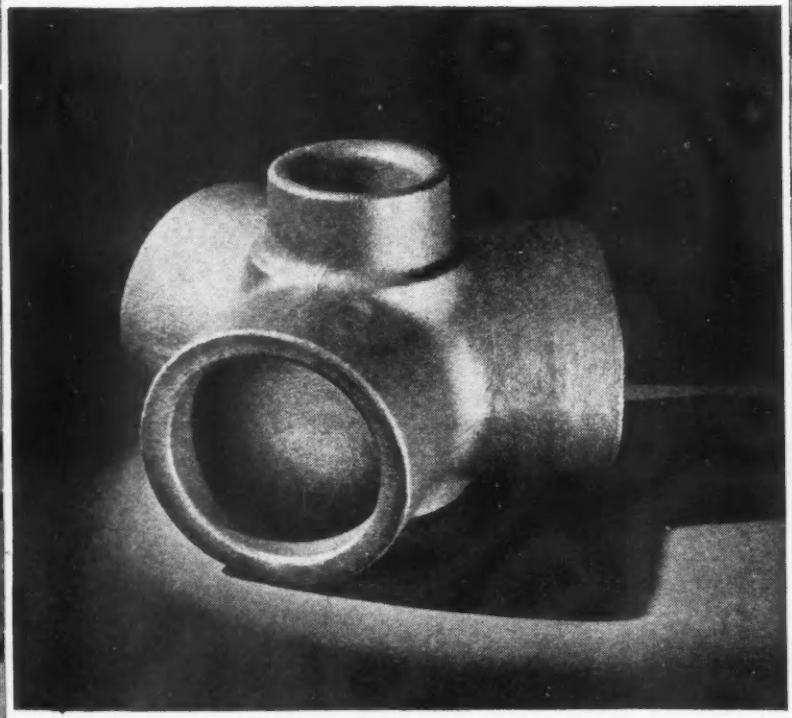
(*Continued from page* 74)

Ford Still Using Planes To Rush Parts to Plants

Although not much has been said recently about air shipment of automotive supplies, Ford Motor Co. still is rushing materials and parts from suppliers to the Rouge and other assembly plants across the nation by air transportation. J. A. Wallace, Ford traffic director, estimates the cost of premium shipping by air express, air freight, and rail express at about $10,000 a day.

United Aircraft Gets Right To 200 Autogiro Co. Patents

The United Aircraft Corp. has acquired the right to use more than 200 patents of the Autogiro Co. of America in a recently concluded agreement. A wartime license covered only procurement for the Government. The new agreement covers commercial production as well.



Just a forging, but—the forging process develops the greatest combination of physical properties (tensile and compressive strength, ductility, impact and fatigue strength) and the greatest uniformity of quality of any method of manufacturing metallic shapes. . . . Wyman-Gordon has pioneered in the development of intricate forgings typical of which is the one-piece propeller hub illustrated here.

Standard of the Industry for Sixty Years

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

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HARVEY, ILLINOIS - DETROIT, MICHIGAN

Court Upholds Lincoln In Tax Dispute

Of widespread interest is the decision recently handed down by the U. S. Circuit Court of Appeals, Sixth Circuit, reversing a ruling by the Commissioner of Internal Revenue and the U. S. Tax Court, and holding that the Lincoln Electric Co. was correct in deducting premiums upon the employees' retirement annuity policy from gross income for tax purposes.

The Commissioner of Internal Revenue had disallowed deductions from gross income in tax returns for 1940 and 1941 for premiums upon the employes' retirement annuity policy, and the disallowance had been upheld by the U. S. Tax Court.

In its decision the Circuit Court of Appeals said:

"The Tax Court reasoned also that the loyalty and efficiency generated among the employees of the petitioner by its incentive plan already existed at the end of 1939, and that in the face of this fact and the prospective impact of high tax rates upon current large profits, the large additional disbursements in the tax years were not necessary to preserve such loyalty and efficiency. This is a novel application to a situation in which psychological factors, group loyalties and business judgment are elements, of the old economic law of diminishing returns. The uncontradicted evidence of the phenomenal growth of the taxpayer's activity, bring in its wake not only greater profits to itself and its stockholders, increased remuneration to its employees and a reduction in the price of its product, destroys completely the force of the suggestion, if any it had.

"The record provides no clue as to why the Commissioner allowed deductions for annuity premiums from 1934 to 1939 as ordinary expenses or reasonable compensation, yet declined to do so in 1940 and 1941 though the earlier contributions were comparable in amount . . .we understand, of course, that the Commissioner may not be constrained to constancy by any rule of estoppel, but reason and logic might have been expected to justify so complete a change of front. Finally, it is not without importance that other incentive plans for the preservation of industrial peace may be thwarted by the decision presently reviewed, even though that ground is not the legal basis for our determination. We think the Tax Court was in error in its interpretation of the law and that its decision should be set aside."

No Decline in Prices Of Personal Plane Engines

Prices of engines for personal aircraft will not go down in 1947 or 1948 in the opinion of C. J. Reese, president of Continental Motors Corp. Mr. Reese said that personal aircraft must be designed around the engine and that major problems confronting the engine manufacturers are noise reduction, which can be partly achieved by gearing; carburetor icing, which can be overcome by direct fuel injection; and lower weight and lower cost starters. He also said that the personal aircraft industry must sell bankers and finan-

(*Turn to page* 84, *please*)

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STERLING ALUMINUM PRODUCTS, INC. ST. LOUIS, MO.

General News

(*Continued from page* 82)

cial interest on the important place and constructive utility of the personal plane in the U. S. economy.

Incentive Plan For Boeing

An incentive plan for both officers and employees has been approved for the Boeing Airplane Co. and the Boeing Aircraft Co. Incentive awards in cash or stock amounting to not more than six per cent of each year's net profits, before provision for Federal or state income taxes, will be made for substantial contributions to the success of the two organizations.

B-W Int'l Handles Service Spring Exports

Borg-Warner International Corp. will handle the export activities of the Service Spring Co. of Indianapolis, Ind., manufacturer of special leaf springs for passenger cars and trucks.

Curtiss Gets $3,150,000 Navy Contract for Parts

The Curtiss-Wright Corp., Airplane Div., has been awarded a $3,150,000 Navy contract for making maintenance and replacement parts for Helldiver dive bombers, Seahawk scout planes and Commando transports. The Curtiss plant in Columbus, O., will do the work, and deliveries are scheduled through the middle of 1948.

Mack Buys Surplus Plant Used for Military Trucks

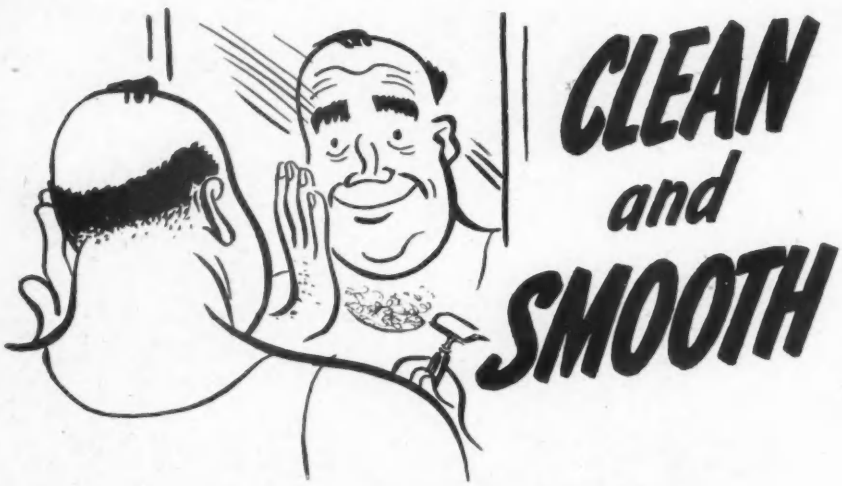
The Mack Co. has purchased from WAA a plant at Allentown, Pa., which the company used during the war for development of new model trucks. Purchase price was reported as $765,000.

Most Over-Market Car Sales Made By Individual Sellers

Following the recent flurry and hubbub of publicity over sale of new cars to used car lots, three basic conclusions seem apparent. The first is that practically all of the sales to the used car lots are made by individuals who have taken delivery from a dealer and immediately peddled the vehicles at a fabulous profit. The second is that, as long as an automobile will bring more in the used car market than the purchaser paid for it from a dealer, the practice is likely to continue. Thirdly, the one cure for the problem is all-out production in such volume that the premium on new and slightly used automobiles will be eliminated. A basic cause of the trouble is that the automobile is such a desirable product that it is the only one today that still will command more than the going market price for immediate delivery. All of the automobile manufacturers have been making extensive checks to determine whether dealers are selling cars directly to used car lots but have found practically no evidence on that score. They say that the only stop gap measure is for dealers to police carefully the distribution of their cars to individuals whom they are reasonably sure will keep the car, but even that is not a very efficient check.

Parish Pressed Steel Expands Frame Production

To meet increased production demands for more automobile chassis frames, Parish Pressed Steel Corp. is constructing a new $600,000 addition to its main plant at Reading, Pa. When completed, the new building will be 250 by 520 ft. Parish supplies Kaiser-Frazer with frames and the added business from this source has required the expansion in facilities.



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